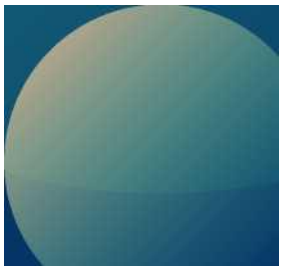


This document is an **automatic machine translation** to English and may not precisely depict facts or figures as they were intended in the original language.

Integrated National Energy and Climate Plan

UPDATE 2023-2030

GOVERNMENT OF SPAIN

VICE-CHAIR
THIRD BY THE GOVERNMENT

MINISTRY
FOR THE GREEN TRANSITION
AND THE DEMOGRAPHIC CHALLENGE

Madrid September 2024 NIPO: 665-20-021-X

Third Vice-Presidency of the Government of Spain
Ministry for the Ecological Transition and the Demographic Challenge
Author: Ministry for Ecological Transition and the Demographic Challenge (MITECO) Published: Ministry for Ecological Transition and the

Demographic Challenge (MITECO) Edition Review: IDAE
Design and Maketting: Abel Guzmán/collectivomelon.com
Cover pictures: iStockphoto and Casey Horner (Unsplash).

TABLE OF CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The opportunity of the green transition

Spain, within the framework of the European Union, has in recent years been addressing an intense green transition agenda which is already proving to be a lever **for modernisation and economic growth, development of in dustrial ecosystems, sustainable job creation, strengthening competitiveness and reducing external energy dependency**, as reported by various international bodies and indicators at national level.

This transition is an opportunity for **developing territorial cohesion, improving human health and the environment, and social justice**. As shown by data from recent years, Spain is particularly well positioned as regards renewable resources, as well as human, technological and industrial capacities to successfully address this transformation.

The National Energy and Climate Plan (NECP) is the national strategic guidance tool that integrates energy and climate policy with a time horizon of 2030, in accordance with national and European legislation.

Since the publication of the first NECP in 2021, this planning exercise has facilitated anticipation and enforcement ofboth sectoral public policies and investment decisions, serving to guide decision-making towards short-term scenarios in a manner consistent with the structural challenges and opportunities in the medium and long term, thus exploiting the competitive advantages available to our country.

The strategic**framework developed around the NECP was set as main objectives: job creation,boosting the competitiveness of the productive fabric, positioning the country as a leader in renewable energies and technologies that will dominate the next decade, rural development, improving human health and the environment, and social justice. Harnessing these opportunities**also allows Spain to contribute to the EU objectives in the Paris Agreement and facilitate the decarbonisation and modernisation of the Spanish economy.

Thus, despite the changing global context, with specific features at European level, this technical frameworkhas been widely recognised by economic analysts, international bodies or third sector entities, and has provided certainty and credibility that has enabled the green transition to become a focal point of economic, social and environmental opportunity in Spain, given its contribution to modernising and transforming the production model.

This is borne out by various indicators and benchmarks. Spain is the 12th country in the world with the most attractive renewable energy investment according to the 63th edition of the Renewable Energy Country Attractiveness Index (RECAI) produced by Ernst de Young. It is also the 7th country worldwide that has a more attractive market for investments in renewable energy.

According to information from the Ministry of Economy, Trade and Enterprise, originating from the Financial Times FDI Markets database, **in 2023 Spain was the world's largest recipient of *greenfield* renewable projects** and the fourth largest *greenfield* direct investment project in the world received in the world in the period 2018-2023.

Spain also accounts for around 20 % of the renewable hydrogen projects announced in the world in 2022, only behind the United States. In addition, the European Commission has selected from among the Important Projects of Common European Interest (IPCEI) hydrogen projects four Spanish projects in the IPCEI Hy2Tech wave of technology, seven in the IPCEI Hy2Use wave of industrial uses and two in the IPCEI Hy2Move transport wave. He also highlighted the recent call for hydrogen cluster projects with over EUR 1.200 million.

This investment attractiveness outlook also materialises in tangible results that demonstrate the deployment of the green transition and its benefits in society and the economy in recent years. Between 2019 and 2023, renewable installed capacity grew by 40 %, from 55.349 MW in 2019 to 77.039 MW in 2023, according to data from Red Eléctrica in Spain1. The generation source that has increased most has been solar PV, which grew by 193 % in this period from 8.747 MW to 25.549 MW, not including all self-consumption,

1httpsendeavour//www.sistemaelectrico-ree.es/informe-del-sistema-electrico/generacion/potencia-instalada

which is largely integrated on the demand side. This method, which, because of its distributed nature, has a particular impact on the nervationof local employment and savings in energy costs for SMEs, households or public authorities, was set as one of the priorities in the original NECP. Accompanied by an important regulatory and push framework, it has grown by 1.600 % since 2018, from 0.4 GW to over 7 GW. Wind power increased by 20 % in this time, from 25.678 MW in 2019 to 30.810 MW in 2023.

This progress has enabled renewable generation to exceed 50 % of total electricity generation in 2023 for the first time in history, making Spain the first largest European economy to achieve this. Putting this data into context at international level, IRENA's ranking in 2022 places Spain as the 2th EU country in wind capacity and 5th in the world, and the 8th country in the world's renewable installed capacity.

This transformation has very positive direct socio-economic impacts. In 2022, the renewables sector employed more than 130.000 people, 54 % more than in 2 018 in Spain, according to the sector2, while Spain continues to position itself as one of the main industrial powers in renewable energy at European and global level. Spain is thus a manufacturer and a net exporter in technologies such as wind turbines, where it ranks as the 5th exporter worldwide in wind turbines, or solar photovoltaic, where it is a benchmark in several key segments of its value chain.

Beyond the energy sector specific indicators, the NECP provides a plan that accompanies society, promotes gender equality, territorial cohesion, making energy cheaper together with renewables and a framework of certainty and anticipation around the energy transition are key to the competitiveness of the whole economía. **The transformation has been reflected in the electricity futures markets and thus in the increasingly better investment prospects, which in Spain find more affordable energy prices than in other European markets, precisely because of the prospect of advancing renewable generation.**

Furthermore, the presence of this opportunity for clean, cheap and secure energy generation from a supply point of view, together with the regulation of self-consumption, allows the installation of production activities close tothe renewable generation zones. This brings about the benefits of the energy transition in the form of industrial and quality employment to the territory.

Therefore, there is a certain "tractor effect" on other areas of economic and industrial development. **Spain is thus showing very promising results in the most advanced and productive forms of foreign investment beyond the energy sector.** According to FDI Markets, in 2022 Spain was the third largest global recipientof injections in the aerospace sector, the fourth largest recipient in various areas, such as the ICT and internet infrastructure sector, projects involving R & D activities, or automotive projects. It has also been the fifth largest recipient of projects related to artificial intelligence and the sixth destination of foreign startup projects.

The green transition is also a tool to protect the economy and social well-being. Among therisks to economic activity and society identified by successive editions of the World Economic Forum's Global Risk Report include environmental risks, which also show a strong interrelationship with other risks3 such as health risks. For its part, the green transition is also shown as a response to other geopolitical risks, as exemplified by Russia's use of energy as a weapon of war in the context of its invasion of Ukraine.

Boosting the energy transition and its benefits for competitiveness, employment, health and the environment is also incorporating measures that strive for better territorial cohesion from just transition, tackling the demographic challenge and generating benefits for rural areas, together with a commitment to reducing inequality, from a gender approach to reducing gender gaps to measures to protect consumers and vulnerable groups. Since the reduction of pollutant emissions and noise in the frameworkof urban transformation injections, projects associated with energy communities that boost economic activity in more rural environments, energy renovation of neighbourhoods or measures to address the energy and price crisis that has seen increasing the social voucher for vulnerable consumers or the public transport bonus (which has experienced a 29 % increase in users compared with the pre-pandemic), the energy transition has had a social and territorial approachin Spain aimed at maximising the opportunities it entails for society as a whole.

In short, the implementation of the public policies included in the NECP has enabled Spain to aspire to be a leading country in the green

2httpsendeavour//www.appa.es/wp-content/uploads/2023/11/Estudio_Impacto_Macroeconomico_Renovables_2022.pdf
3httpsendeavour//www.weforum.org/publications/global-risks-report-2024/

transition, as demonstrated by the achievements made. **It is a transformation in which the Spanish economy gains competitiveness, prosperity, energy security and strategic autonomy, employment,innovation, technological development, well-being and reduction of energy poverty.**

Energy and Climate Policy Framework

The commitment to the green transition is also part of the **strong commitment to combating climate change**, **which continues to have a clear impact on health, the environment and the economy. In**this context, Spain has set itself the objective of achieving climate neutrality by 2050, as set out in the Law on Climate Change and Energy Transition. To this end, the NECP incorporates Spain's contribution to achieving thestable objectives within the European Union, while developing policies and measures to seize the opportunities that this agenda brings to the country. In 2020, Spain published its first integrated National Energy and Climate Plan forthe ripe 2021-2030, which was welcomed by the European Commission4. In other analyses prepared by various international bodies, as well as civil society entities and economic analysts5, the ambition and clarity of the objectives and framework set by Spain havealso been enhanced.

Since the adoption of the 2021-2030 NECP, the development and implementation of energy and climate policies have beensuccessful in completing the strategic framework with several key elements, thus forming a Strategic Energy and Climate Framework that reinforces the comprehensive and coherent nature of all public policy in this area:

The Long-Term Decarbonisation Strategy, which sets out a path based on technology and noteworthy knowledgethat projects the development of the energy transition from the completion of the NECP in 2030 to climate neutrality in 2050, and provides the great signals for decision-making in both public policies and investment, aimed at harnessing opportunities on this path for job creation, improving quality of life and economic and industrial competitiveness in Spain. This strategy is a living document that will be updated toreflect the progress made in this revision of the NECP and the new European targets adopted and those that will be set shortly, extending the timeframe for the transition to the long term.

For its part, the above-mentioned **Law 7/2021 of 20 May 2011 on climate change and energy transition** aims to ensure compliance by Spain with the objectives of the Paris Agreement, to facilitate the decarbonisation of the Spanish economy and its transition to a circular model; and to promote adaptation to the impacts of climate change and the implementation of a sustainable development model that creates decent jobs and contributes to the reduction ofequality. This standard provides a legal framework for the NECP 2021-2030 and the objectives contained therein, and also develops regulatory tools in the fields of renewable energy and energy efficiency, fossil fuels, mobility and transport, adaptation to climate change, just transition, education and R & D & I.

In addition, the **Just Transition Strategy**6 aims to foresee and manage in a spirit of fairness and solidarity the consequences for those districts and people directly linked to activities that will be progressively displaced as a result of the transition. In line with this strategy, it has materialised in the progressive development of the Just Transition Conventions, with the deployment of numerous measures to support new investments or services, support for workers, specific measures to facilitate the energy transition and the renewable value chain in these areas, support for entrepreneurs and projects improving social and environmental services in areas sometimes suffering from depopulation7.

Synergies between the green transition and addressing the demographic challenge are also among the objectives of energy policy. Therefore, as part of the measures of **the "Recovery Plan: 130 measures against thegraphic challenge'**highlight investments targeting municipalities with fewer than 5.000 inhabitants in areas such as improving the energy efficiency of buildings and public infrastructure, renewable energy generation and consumption, boosting self-consumption and energy communities or sustainable

4 Commission assessment (SWD/2020/908) of the final NECP of Spain

5 Among others, analyses of the Spanish energy and climate framework have been published by the International Energy Agency; European Climate Foundation, and business analysts such as RE100 or BloombergNEF.

6Fair transition strategy

7Spain, 4 years moving towards just transition

mobility.

For its part, some of the key measures and areas set out in the 2021-2030 NECP have been developed in **strategic summits and sectoral roadmaps**, which have in turn expanded and clarified the definition of opportunities and actions to achieve the objectives around specific technologies or areas: the Hydrogen Roadmap: a commitment to renewable hydrogen, the energy storage strategy, the road mapfor toconsumption, the roadmap for the development of marine wind and marine energy in Spain, the Biogas Roadmap and the Roadmap for the sustainable management of mineral raw materials.

These instruments **complement the setting up of the Strategic Energy and Climate Framework** and, like the NECP, have included an intensive public participation process, through consultations prior to its preparation, processes toinform the public of drafts or specific working days, with the participation and input of specialised sectors, civil society and all stakeholders.

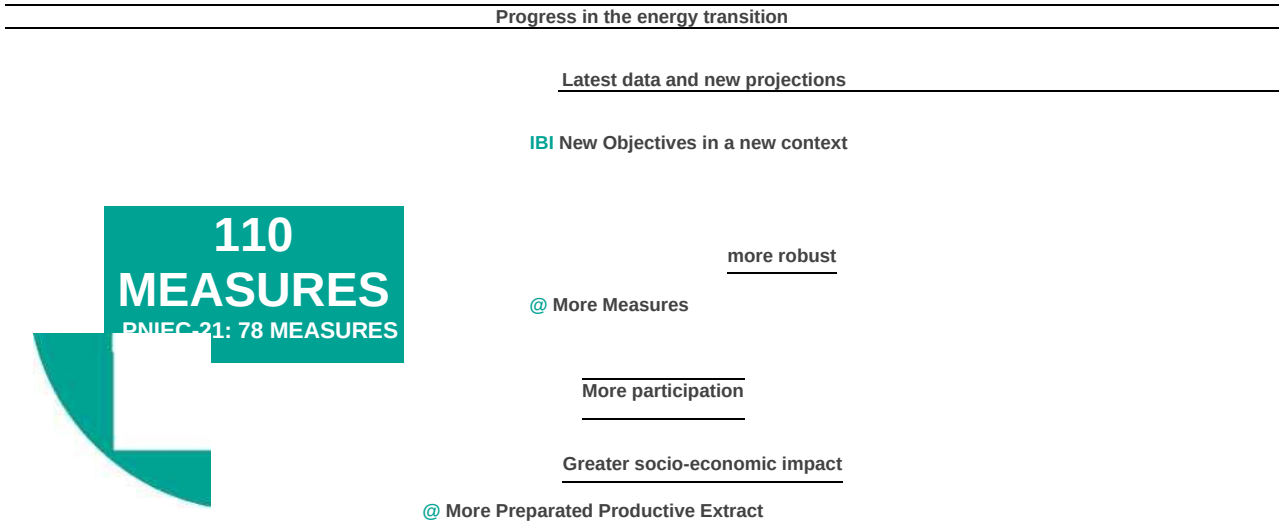
New context for accelerating the energy transition

Since its adoption, the NECP 2021-2030 and the various roadmaps have already begun to deployTheir efec, making the regulatory, strategic and governmental framework consistent with the policies, measures and objectives set. Thus, since 2020, more than 200 strategic documents, acts and rules have been adopted which have translated the strategic objectives into concrete provisions and regulations, with a clear impact on the acceleration of the energy transition in Spain and the benefits it brings, inter alia, in terms of reducing emissions, competitive energy prices, attracting new investments and generating welfare or employment.

Moreover, the situations in recent years, since the one caused by the COVID-19 health crisis, the invasion of Ukraine and the recovery and resilience plan, set the context in which the energy transition has progressed in these years.

The **European regulatory framework provides for a regular review and update exercise of energy plans and CLIma**. Regulation (EU) 2018/1999 of 11 December on Governance for the Energy Union and Climate Action defines in its Article 14 a timeline for updating the Plans, where targets can only be revised upwards. In the same vein, the Law on climate change and energy transition is adopted.

As part of this review, the NECP update process responds to several elements linked to an update of the objectives at European level and a new context of accelerating the energy transition facilitated by regulatory developments, driven by the need to strengthen strategic autonomy and underpinned by the Recovery, Transformation and Resilience Plan (hereinafter PRTR):



First, the energy landscape has changed significantly since the adoption of the previous NECP.

In recent years, all Spanish citizens, the business fabric and civil society have been increasingly pro-agonistin the energy transition in our country. Since the adoption of renewable self-consumption systems per pairof hundreds of thousands of households, businesses and entities; the creation of new businesses, products and new business models with which the productive fabric is proposing energy solutions based on new technologies; or input into the processes of participation and consultation of energy and climate policy and policy instruments; there is evidence of greater involvement of society as a whole: Spain is better positioned and better prepared tomiss the opportunities of the green transition.

The impact of events in recent years, such as the COVID-19 pandemic, which impacted economic growth and energy consumption, has also been decisive; as well as following the subsequent spread ofration at global level. On the other hand, the crisis caused by Russia's invasion of Ukraine has brought the criticality of energy security back to the centre of the social, economic and political focus, highlighting the vulnerability of external energy dependence in terms of prices, confidence and availability of supply, and has led toa stronger commitment to the energy transition and the strengthening of its value chain by national, regional and local euro institutions, as well as by the entire business fabric. By way of example, according to the Observatory of Business Competitiveness of the Spanish Chamber of Commerce, almost 60 % of companies took measures in response to the international energy price crisis, including improvements in energy efficiency orincarceration of renewable self-consumption8.

Finally, we would once again highlight the progress made in implementing the green transition policies that have been pursuedin recent years, which have already made decisive progress in this area, notably the supply of more than 50 % of renewable electricity in 2023.

Secondly, this update of the NECP responds to a significant increase in climate ambition at European and national level.

The adoption of the European Climate Law brought about a legal consolidation of the objective of climateneutrality by 2050 and an increase in the objectives at European level for 2030 from an emission reduction target of 40 % to 55 % compared to 1990. As a result, the European Commission proposed a package of legislative proposals called "Fit for 55", designed to update various directives and regulations in areas related to energy and climate to meet the objectives set. This update of the NECP aligns it with the new binding European framework.

In addition, by 2040, the process of setting a new intermediate European net emission reduction target of 90 % compared to 1990 has already been launched, as set out in the Communication from the Euro Commission *"Securing our future: Europe's 2040 climate target and the way to climate neutrality by 2050"*.

Thirdly, the push for the acceleration of the energy transition brought about by the PRTR is incorporated.

In this regard, in the face of the international pandemic declared by the World Health Organisation in March 2020, the energy transition has proven to be a key driver of economic recovery, highlighting the need to boost and accelerate the decarbonisation agenda. In response to this crisis, the EU launched *Next Generation* EU, which represents an investment of EUR 750.000 billion for the EU as a whole, of which 90 % are built through the Recovery and Resilience Facility.

As highlighted by the European Commission in its analysis of the Spanish NECP 2021-2030, this was a firm basis for the design of the PRTR's climate and energy measures, the instrument designed to channel Spain's funds in this context.

Thus, the PRTR is already providing key support to businesses, households and entities to carry out actions that lead to improvements in quality of life or greater competitiveness and ultimately enable the implementation, acceleration and enforcement of policiesand measures provided for in the NECP: from investment by different public entities to strengthen public transport or infrastructure facilitating walking and cycling, and to boost the deployment of a network of facilities for charging electric vehicles, both publicly accessible and fleet linked; a strong commitmentto the energy renovation of entire neighbourhoods and buildings, with accompanying measures such as 'renovation offices', which have seen the pace of housing renovation soared by 150 % compared to 20199; the accelerated deployment of renewable energy, in particular those embedded in buildings or production processes, such asself-contained or the use of thermal renewables in industry or service sectors that have enabled thousands of companies to reduce or eliminate their dependence on fossil fuels and the associated price volatility; storage facilities facilitating the integration and management of renewables; boosting the development and digitalisation of distribution and trans-transportnetworks; the deployment of renewable hydrogen moving fossil fuels in different sectors; energy improvement of public infrastructure itself; investment in new technologies, R & D & I, new business

8httpsendeavour//www.camara.es/sites/default/files/documents/Observatorio%20competitividad_Energia%20-%20n8-2022.pdf
9httpendeavour//www.cscae.com/index.php/conoce-cscae/sala-de-comunicacion/8697-la-edificacion-en-espana-registra-sus-mejores-nive-les-desde-2019-en-work – New and rehabilitational

models and strengthening the business fabric associated with the green transition; or policies that accompany and facilitate the positioning ofindustrial sectors in the face of the opportunity of the energy transition.

As a first step, the PRTR is mobilising close to EUR 70.000 billion of public investment, of which 39.7 % is dedicated to the green transition, this being the main driver of implementation of the Plan, confirming Spain's commitment to transforming the economy to promote a sustainable future and the opportunity for society and the economy as a whole driving this transformation.

These investments put the country in a more robust position for the continuation of the energy transition over the decade: in short, they have made it possible to bring forward or strengthen the lines of action provided for in the previous NECP, resulting in reinforced measures and actions or re-inclusion in this update.

Fourth, the geopolitical context and the need to strengthen strategic autonomy have been taken into account. Therefore, another strategic document included in this updating process is the Plan + SE, approved in 2022Tubre, with the aim of providing more security against energy prices for households and the Spanish economy as a whole, and helping to increase the European Union's security of supply.

In this context, the strengthening of the strategic autonomy of Spain and the European Union is not only identified asa nece, but also as an opportunity to improve competitiveness and strengthen the value chain. Thus, theEuropean regulation has been rolled out to strengthen Europe's zero-emission technology manufacturing ecosystem, which aims to improve the functioning of the internal market by establishing a framework for TICE the Union'saccess to a secure and sustainable supply of net-zero technologies, including by expanding the manufacturing capacity of net-zero technologies and their supply chains to protect their resilience. This reduces the risk of emissions shifting to other regions and protects the potential of European industry. Together with the European Regulation on Critical Raw Materials and the reform of the electricity market design, it sets out a clear European framework to reduce the EU's dependence on importsand foster its strategic autonomy, helping to increase the resilience of European clean energy technology supply chains.

This legislation will help boost the value chain and strengthen the industrial ecosystem, increasing capacities for manufacturing leveraging technologies for climate neutrality in the EU to provide at least 40 % of theEU's annual deployment of strategic *net-zero* technologies by 2030, including sustainable energy.

The initial NECP already identified the opportunities of the energy transition for the whole value chain, as an opportunity for the development of new technologies, industrial capabilities or business models contributing to thistransformation. In the light of the context described above, this update further develops the focus on strategic autonomy, both with a significant increase in external energy dependency reduction, and withspecific features associated with manufacturing and technologies in the value chain associated with the transition and the strategic raw materials needed for this.

Another set of elements that have served as the basis for this updating process are theroadmaps and thegies that have been approved during this period. Theseroadmaps and strategies specifically involve the development of some of the measures that the NECP itself enacted and have made it possible to concretise and develop these measures, deepening how these sectors will contribute to the decarbonisation of the economy as a whole, complementing the Strategic Energy and Climate Framework.

These roadmaps and strategies have already demonstrated potential to meet the objectives set: the development of a medium-term visibility and certainty framework to guide and facilitate both public policy and investment decisions for the deployment of different technologies and actions. In some cases, this momentum has already improvedthe quantitative forecasts contained in these roadmaps, thereby contributing to the increased ambition that this update of the NECP intends to capture.

In addition, the updated plan incorporates the most recent context and new regulatory developments and progress in the energy transition.

In particular, in the second half of 2023, most of the initiatives in the Fit for 55 package have been closed bythe Spanish Presidency of the Council of the EU. At the time of drafting the final version of the2030 NECP, a framework of directives and regulations adopted and

in force has already been available, including, inter alia, the reform of the electricity market, the European regulation to strengthen Europe's zero-emission technology manufacturing ecosystem, the European regulation on critical raw materials, the extension of the emission rights system and its Social Climate Fund, or hydrogen and gas packages.

At national level, the energy transition is at a very good pace thanks to progress since the adoption of the previous NECP, which also forms the context of the NECP 2023-2030. In the necessary area of boosting **theflexability** of our energy system, significant progress has been made in developing **capacity mechanisms or reforming the electricity market**. Also with regard to networks, which is a key element of the electricity system, the process **of planning the transmission system for 2030** has started, and work has been carried out on the analysis ofthe limits and **investment criteria in the case of distribution networks**. The development of a system of **Energy Saving Certificates (CAE)** has also been completed, which will be a key element in boosting energy efficiency, making it possible to recover part of the cost of investment in actions in this area.

In addition, the second phase of the PRTR, known as the **addendum to the PRTR**, which provides for more than EUR 10.000 billion in grants and up to EUR 84.000 billion in loans, was approved in October 2023. These resources will allow, inter alia, to continue under PERTE ERHA support programmes that have beenoverwhelmingly successful, such as those related to self-consumption and storage behind the meter or renewable hydrogen, as well as to open new strategic lines such as those related to support for the industrial value chain linked to the energy transition. Of the new part relating to loans, it should be noted that more than EUR 22.000 million corresponds to the ICO VERDE line, which aims to make it easier for businesses and the self-employed and for households to develop investments in areas such as sustainable transport or renewable energy.

As regards investments, **the addendum focuses on increasing the allocation of the 12 PERTEs currently**under10 **way**, in particular to strengthen those that contribute to Spain's greater **strategic autonomy** in terms of energy security, agri-food, technology and digital.

Apart from the reinforcement of the PERTE for renewable energy, renewable hydrogen and storage (PERTE ERHA), the increase in the ambition of the PERTE for Industrial Decarbonisation under the Addendum should also be highlighted.

In short, the implementation of the various initiatives of the different PERTE, both in the original version of the PRTR and in the addendum, which include the most strategic measures of the Recovery, Transformation and Resilience Plan, hasled to real progress in energy transition policies. Among the most notable are the following:

- For the development of the electric and connected vehicle
- Renewable energy, renewable hydrogen and storage
- The circular economy
- Digitalisation of the water cycle
- Industrial decarbonisation

Technical and analytical basis

The PNIEC 2023-2030 maintains the technical and analytical approach of the Plan used to draw up the initial Plan, reinforcing the analytical basis of the models11. Thus, the objectives and expected results for 2030 are thefocus of an energy modelling and projection exercise, based on an internationally recognised model adapted to the national energy system: the TIMES-Sinergia tool, improved and reinforced with respect to the NECPerased in 2020. This tool is complemented by other specific tools for the analysis of the electricity system (plexes and, as a novelty of this update of the PNIEC, the linear optimisation model for the analysis of the operation of the OpenTepes electricity system), the analysis of the macroeconomic impact (DENIO) and health (TM5-FASST), as well as the

10 Strategic projects for economic recovery and transformation (PERTE)
11 Annex B to the PNIEC 2023-2030 contains detailed information on all the models used for its production.

greenhouse gasemission projections (model of the Spanish Inventory and Projects System). All these analytical models are interlinked as a coherent system of results.

This analytical exercise makes it possible to check the contribution of each of the factors and measures to the achievement of the objectives. In addition, **a large team of experts and experts has been set up with** people from differentministerial areas, which in turn has received **technical assistance from academic and research centres**,with extensive experience and knowledge in the fields of economy, energy and climate change, as well as with the collaboration of REE, as System Operator. The NECP also integrates a social **andeconomic impact analysis**, which concludes significant positive impacts on GDP, employment and public health, showing a socially progressive effect, i.e. with a greater positive impact on lower-income households.

The**construction of scenarios and the design of policies and measures requires a thorough knowledge of the starting point, in order to have a true and fair view of all sectors of the economy to identify where and how most needs to be** done to achieve the overall decarbonisation objectives withthe best. In this respect, it is essential to have robust statistical data to inform the projections that make up the foresight exercise. In line with **this, the most recent available statistical data making up the energy balance, which is the most complete statistical accounting of energy products and their flow into the economy, has been used for this updating process** and is reported annually to Eurostat, in accordance with Regulation (EU) 2022/132 on energy statistics. In addition, macroeconomic and input assumptions have been updated, with new projections including the new context. The modellingexercise on which the NECP is based uses variables calculated using common methodologies at European level to ensure comparability of plans across countries.

Participation and consultation process

A broad participation and consultation process has been carried out during the NECP update process.

First, a process of prior public consultation took place in August and **September 2022**, with the aim of informing Spanish society as a whole, participating and making proposals for the NECP. Over 2.000 contributions were received during the consultation from more than 120 different actors, most of them associations and companies, but also from the public and academic sector, among others.

Subsequently, between April and May 2023, 'Workdays**for the update of the National Energy and Climate Plan**' were held around sessions developed as a forum for discussion and dialogue, with the ultimate aim of discussing the different inputs and views of various actors representing multiple sectors and areas of the economy, related to the NECP, as well as actors involved in the prior public consultation. The event was attended by a large number of organisations representing sectors interestedin energy and climate policies, including civil society representatives such as non-governmental organisations, environmental, rural and consumer organisations; business organisations in the waste sector, etc.; monitoring and market operation organisations; and representatives of the research and development sector.

As a result of this process, input from expert teams and input from the partici pationprocesses, **the draft for the update of the National Energy and Climate Plan 2023-2030 was published on 28 June 2023**.

Thus, from 28 June to 4 September 2023, the public consultation process on the **draft update of the plan took place**, which gathered input, comments and proposals from all the stakeholders before the final document was drawn up. More than 380 actors participated in this consultation process and more than 10.000 inputs were received, which have been taken into account for the update of the NECP.

In turn, in accordance with the European governance regulation, Spain sent this draft to theEuro Commission for analysis. On 18 December 2023, the Commission published its assessment of the draft update of Spain's NECP, noting that it **is ambitious, comprehensive and detailed in terms of the measures taken toachieve its objectives**. In addition, it appreciated the robustness of the quantitative analysis underpinning the results and noted the **public participation** process as appropriate. The Commission highlights the path to increase **renewables**, energyefficiency medi or to ensure **energy security**, the **Just Transition** Roadmap and the proper identification of **climate adaptation** risks and vulnerabilities. On the basis of this evaluation, the Commission issued a number

of recommendations for the preparation of the final plan. **The contribution of improvements in response to the Commission's recommendations is, together with the outcome of the various consultations carried out, one of the key elements that determine this final version of the report.**

Following the publication of the draft, spaces for participation and reflection have continued to be created, which have tripledthe updating of the Plan and have made it possible to improve the policies and measures contained therein and to have even more ambitious and better aligned results.

In addition, in the field of public participation, the listening and participation **processes took place in March 2024: Renewable Energy and Territory.** These days have been set up as a forum for listening, dialogue and participation, which have made it possible to learn about the current situation, to exchange experiences, to update technical knowledge, and to identify instruments and areas for action, since both opportunities and benefits, as well as the difficulties and challenges associated with the deployment of renewables in the territory, must be taken into account. An area of work that has seen, as a result, a strengthening in the NECP of the processes and mechanisms for the proper integration ofrenoots into the territory.

More recently, on 27 June 2024, the draft update of the NECP was submitted for consideration by the Co-Mission for the **Coordination of Climate Change Policies**, as the coordination and cooperation body between theGeneral State and the Autonomous Communities, and the **National Climate Council**, as an institutional forum for the participation of all public administrations, as well as organisations and bodies representingsocial and environmental stakeholders in the drafting and monitoring of climate change policies promoted by the State.

Strategic environmental assessment

In compliance with Law 21/2013 on environmental assessment and in line with the 2021-2030 PNIEC, the update of the 2023-2 **030 NECP has been subject to a strategic environmental assessment**, making it possible to have an updated plan that complies with all the guarantees from an environmental and territorial point of view.

As part of this environmental assessment, the **public information phase** has been carried out (from 12 June to 12 July) and consultations have been carried out with the **public administrations concerned and interested persons in the environmental study. TheNECP** is the subject of a new participation window, in this case with regard to the two-way issuesof the NECP.

This strategic environmental study concludes that the overall effects of updating the NECP show a **biental balance, given** the importance of its positive effects in terms of emissions mitigation and combating climate change, which benefit a wide range of resources and values, both ecological andsocio-economical; and the possibility of mitigating their potentially negative effects, ensuring compliance with the established environmental quality standards and objectives, thanks to both environmental legislation and specific measures incorporated in the Plan.

In this regard, the Strategic Environmental Study (SEA) and the Strategic Environmental Declaration (SEA) resulting from the process incorporate the **criterion of no net loss of biodiversity**, which will result in the application of appropriate preventive and corrective measures, the assessment of residual impacts and their compensation, establishing environmental, social and human health determinations to be taken into account in the actions taken into account in the implementationof the NECP, as well as for its monitoring.

The**Strategic Environmental Declaration concluding the Strategic Environmental Assessment process reinforces the NECP's commitment to the territory**, which includes specific measures and a broad proposal reflected in the Environmental Study. The EAD also **welcomes the elements of environmental integration incorporated in the Strategic Environmental Study**, and establishes different environmental monitoring tools and systems based on indicators and geographical information, and on access to information, based on the content of the ESEA.

The**EAD decides that updating the 2023-2030 NECP**, incorporating the environmental measures and recommendations set out in the

ESAE, together with the environmental determinations incorporated therein, **will not havean impact on the environment.**

Coherence with other policy and planning instruments

As a central part of the Strategic Energy and Climate Framework, the Plan maintains and updates its coherence withthe relevant planning or strategy instruments in this context.

The NECP is also connected to the other major aspect of climate change, **namely adaptation** to pressures andpacts arising from it. To this end, the National Plan for Adaptation to Climate Change 2021-2030 was adopted in 2020 as a basic planning instrument to promote coordinated action against the effects of climate change in Spain. This plan includes areas of work such as energy, mobility and transport, water resources, coasts and the marine environment, industry, forests or the agricultural and food sector. There are elements in which both plans reinforce each other. This is reflected in a new, cross-cutting measure of the NECP that createsand makes explicit these relationships to integrate adaptation objectives into energy and climate planning.

Another key aspect in this process, as already stated in the environmental assessment process described above, is to ensure the compatibility of the implementation of the NECP with the territory and the conservation of biodiversity. When deploying the major developments in renewable technologies provided for in this Plan, it is ensured that **their natural heritage is preserved in a responsible manner, in particular the protection of their biological diversity**, which is one of the highest and most valuable in Community Europe.

In line with this, and in line with the provisions of the Law on Climate Change and Energy Transition in this case, **the 2030 National Strategic Plan for Natural Heritage and Biodiversity**, the Spanish Forestry Plan, as well as **the National Climate Change Adaptation Plan (2021-2030)**, among others, are activating different tools to ensure that actions linked to decarbonisation are deployed in a manner compatible with the objectives of preserving and restoring Spain's natural heritage.

On the other hand, the measures in the Plan relating to the use of water resources take into account the **protection of the Public Hydraulic Domain** (PHD) and the status of water bodies.

The NECP is also complemented by the **Circular Economy Strategy** adopted in 2020, so that in this updating process the existing interlinkages between decarbonisation and the circular economy are deepened. It goes hand in handwith the update of the **National Air Pollution Control Programme 2023-2030**, which sets out cross-cutting and sectoral measures in line with the climate and energy policies defined in the NECP and willreduce very significantly the levels of pollutants that are very harmful to health.

In relation to the R & I & c dimension (research, innovation and competitiveness), the NECP is aligned with the State Plan for Scientific, Technical and Innovation Research (PEICTI) updated through the PEICTI 2024-2027, approved by the Council of Ministers on 7 May 2024. The PEICTI incorporates a number of regulatory and strategic developments and developments affecting the Spanish Science, Technology and Innovation System (SECTI), both within the national and European frameworks.

The Plan also includes a gender perspective. So far, no specific studies have been carried out onwomen's parti cipation in the energy transition. However, recently the Just Transition Institute has collaborated on the development of a dedicated report based on national statistics, which will allow to analyse the evolution of participation during the NECP framework until 2030. **Women's equal participation will be strengthened in the renewable energy sector**, taking into account the competition between sectors of the economy for attracting talent, and the needs for skilled labour for the implementation of the Plan.

The NECP 2023-2030 is fully connected to the **Sustainable Development Goals** (SDGs) agenda. While the Plan has a particularly direct impact on SDGs 7 and 13 (affordable and clean energy for all people and climate action, respectively), interactions with the other SDGs are important, as set outin Annex E, which links the actions set out in this Plan to the various Sustainable Development Goals.

In**summary, the key factors that have marked the process of updating the NECP have been the increase inclimate change at European level and the need to strengthen strategic autonomy, progress in the transitionfrom the previous document, the**

impetus of the Recovery, Transformation and Resilience Plan, as well as participatory processes and the various areas of collaboration, as well as the European Commission's assessment ofthe draft update of the 2023-2030 NECP submitted in June 2023.

Main results

As a result of all this process of analysis and energy modelling, updating the regulatory framework and technical and stakeholder input, the policies and measures included in this update of the NECP will enable the followingresults to be channelled in 2030:

- 55 % reduction in greenhouse gas emissions compared to 2005, a 32 % reduction in emissions compared to 1990.
- 48 % renewables over energy end-use.
- 43 % improvement in energy efficiency over final energy use, compared to projections of abaseline scenario without measures.
- 81 % renewable energy in electricity generation.
- Have 19 GW of self-consumption and 22.5 GW of storage.
- Reduction of external energy dependency from 73 % in 2019 to 50 % in 2030.
- 42 % reduction in emissions from diffuse sectors and 70 % of sectors under emissions trading compared to 2005.
- Have a 35 % electrification rate of our economy.

These results represent a path compatible with the objective of turning Spain into a carbon-neutral economy by 2050.

GHG emission reduction

For a1990

NECP 2021
23 %
NECP 2023
32 %

Above their value

NECP 2021
49 %
NECP 2023
55 %

Energy efficiency

NECP 2021
41.7 %
NECP 2023

% of renewables over final energy

PNIEC 2021
42%
PNIEC 2023
48%

% renewables in electricity generation

PNIEC 2021
74%
PNIEC 2023
81%

Energy independence

2019
27 %
PNIEC-21
39 %
NECP – 23
50 %

As can be seen from these data, the implementation of this Plan **will transform the energy system towards greater self-sufficiency inenergy** efficiency, which is essential in the current geopolitical context, based on using efficiently the **existing renewable potential in our country**, in particular solar and wind power. To this end, the deployment ofthese technologies will be accompanied by the development of **flexibility** in the energy system, through **energy storage and demand-side management**. This transformation will have a positive impact on national **energy security** by significantly reducing dependence on high economic bills of fossil fuel imports that are subject to geopolitical factors and high price volatility, as has happened in recent years.

This update of the NECP improves the mechanisms aimed at supporting people, territories and economic sectors to **seize the opportunities of this context of green transition**. This is all the result of a context where the transition is accelerating to respond to three important assumptions: combating climate change, boosting economic activity and strengthening strategic autonomy.

Moreover, this update of the plan represents a great opportunity in terms of economic growth and employment.

The result of this update is a more **ambitious, robust, autonomous, participatory** and **socially accountable NECP,** adapted to the transformation of the energy system since 2020.

Main novelties of the NECP 2023-2030

The 2023-2030 NECP shows a number of significant developments with regard to the 2021-2030 NECP in different areas:

1. **Increased ambition in line with Spain's strong commitment to fighting climate changeand delivering on the Fit for 55 package.** This increase is the result of a context where the green transition is accelerating to respond to three important assumptions: climate change, increasing economic activity and strengthening strategic autonomy.

   Among the most ambitious targets are **the reduction of emissions where the effort increases by more than a third** compared to the 2021-2030 NECP, from 23 **% to 32 % compared to 1990 levels, representing a 55 % reduction in 2005 levels**.

   Renewable penetration grows to 48 % of final energy consumption in 2030, an increase over the decade higher than expected in the previous Plan, which was expected to reach 42 % of renewables in 2030. This increase goes hand in hand with strengthening measures to promote flexibility, storage and demand-side management.

   For its part, the **final energy efficiency reaches an improvement of 43 % by 2030** compared to the baseline2007 scenario, while in the 2021-2030 NECP it stood at 41.7 %.

2. **A very remarkable strengthening of energy self-sufficiency, with a positive impact on national energy security by significantly reducing dependence on fossil fuel imports** that represent a high economic bill and are subject to geopolitical factors and high price volatility.

   In particular, the reduction of external dependency over the decade envisaged in the Plan is doubled: this penaltyis drastically reduced by 23 points over the period, which represents a reduction of 11 points compared with the previous NECP, with the result that, according to the plan's forecasts, **50 % of primary energy will come from indigenous sources in 2030**, compared with 27 % in 2019.

   The expected economic savings in fossil fuel imports over the decade are estimated at EUR 86.750 billion.

3. **Measures to accompany the transition from a social and territorial point of view are established and strengthened**.

4. The update of the NECP incorporates specific measures that provide greater support to consumersof their nervables, but also measures to generate positive socio-economic impacts on rural territories, progress towards a just transition and inclusion of a gender approach. In particular, **measures for biodiversity-compatible renewable development are updated**.

5. It incorporates **measures for renewable development that sets out socio-economic benefits in rural** areas, promotes the social development of these areas and improves territorial cohesion and the fight against depopulation, with particular emphasis on the Demographic Challenge.

6. **Measures to protect energy and transport consumers and combat energy** poverty have been strengthened in line with the policies pursued in recent years.

7. The **future Social Climate Fund** will make it possible to design new measures for vulnerable households, micro-enterprises and transport users, with the aim of strengthening territorial and social cohesion, introducingme in favour of progressivity with a particular impact on lower incomes.

8. **Just transition measures are strengthened** with the inclusion of measures related to the Just Transition Fund, and measures are also included in relation to the demographic challenge.

9. **Gender mainstreaming is mainstreamed** throughout the Plan.

10. The contributions gathered in the public participation processes maintained during the preparation of thePlan, including those carried out as part of the Strategic Environmental Assessment procedure, are incorporated.

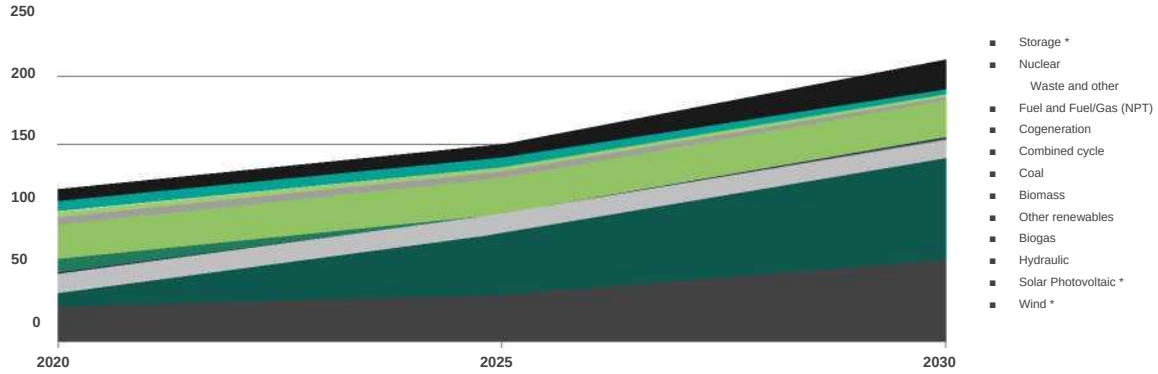
4. The role of adaptation to climate change is included across the board by incorporating anutshell measure that specifies and makes explicit the synergistic relationships between the NECP and the National Climate Change Adaptation Plan to identify risks and vulnerabilities and integrate adaptation objectives intoenergy and climate planning.

5. **In the electricity sector, the renewables mix amounts to 81 % in 2030**, compared with the 74 % previously projected,namely the greater integration of renewables into the electricity system, energy storage and flexibilty, and significant growth in self-consumption, supporting the commitment to electrification as a key driver for decarbonisation.

Renewable deployment is also accompanied by new measures aimed at improving the social, ruraland environmental integration of projects.

- + 105 GW renewable installed capacity up to 160 GW
- 81 % renewable electricity generation
- 22.5 GW of energy storage
- 19 GW of self-consumption
- 12 GW of electrolysers
- Cessation of coal activity in 2025
- 3.2 GW of nuclear

Installed capacity (GW)



6. **The focus on storage and flexibility to ensure the integration of renewables into the mix is strengthened**, with coordinated measures in several of the dimensions of the NECP. The rapid development of electric renewables makes it necessary to speed up the installation of storage and demand-side management systems, which is becoming a reality thanks to levers such as the PRTR, or the adaptation of the regulatory framework in recent years to facilitate this deployment. This update pays particular attention to these solutions. The Energé tico StorageStrategy foresaw 20 GW of energy storage in 2030. With the 2023-2030 NECP, these forecasts were exceeded, raising them to 22.5 GW in 2030.

Thus, in addition to reinforcing the measure provided for in the original NECP on storage and flexibility, this updateaddresses with new measures the development of new hydroelectric storage capacity taking advantage in particular of existing reservoirs, the launch of capacity markets to secure the necessary investments in the medium and long term, as well as the reform of the electricity market, which must also provide the necessary signals to speed up the installation of storage systems. In addition, new measures around new business models for the energy transition and local electricity markets will also support the deployment of flexibility, storage and demand-side managemability, including a measure to strengthen the industrial value chain of these technologies.

7. **A specific self-consumption deployment target is set at 19 GW installed in 2030**, covering **11 % of demand**. This technology is key to democratising the energy sector andengaging citizens but also for business competitiveness. The establishment of a robust and ambitious path to 2030 is possible thanks to developments in recent years, both at regulatory level and in the Recovery Plan, which **even goes beyond the most ambitious scenario envisaged in the Self-Consumption Roadmap**.

8. **The electrification of the economy is increasing over the decade as one of the key drivers ofcarbonisation**, increasing to **35 %** in 2030, incorporating **new projects**, further electrification in industry, more green hydrogen production, and new demands associated with new services related to the digital transformation of our economy. **This means forecasts of around 30 % higher than those envisaged in the 2021-2030 NECP, increasing electricity demand by 34 % in the decade.**

   With regard to electric vehicles, forecasts are increased to a fleet of **5.5 million tric vehicles in2030** (10 % higher than the target set in the PNIEC 2021-2030). In turn, a significant roll-out ofheat pumps is envisaged as one of the key solutions for the electrification of end-uses in all sectors (residential, services and industry).

   This progress in electrification facilitates not only the penetration of renewables in areas where the use of fossil fuels is still predominant, but also primary energy savings and, in many cases, significant savings in energy consumption for consumers. To this end, the measures have flanking mechanisms in place to facilitate broad access for society and economic fabric to these more

efficient alternatives and, therefore, the possibility of capitalising on the cost savings they entail.

9. **More support levers are introduced for the decarbonisation of industry, which is essential for a sustainable industry, ensuring its global competitiveness**. Energy efficiency, technological innovation, electronics, self-consumption or green hydrogen are key levers for this. Among others, industry challenges the substitution of natural gas and fossil-based hydrogen for high-temperature thermal uses or as feedstock. Today, a key tool is available to drive this process forward under the PRTR: The PERTE for Industrial Decarbonisation, which foresees a total investment of EUR 11.600 million, with a public sector contribution of EUR 3.100 million. With the measures foreseen in the NECP, partly driven by this RERTE, it is estimated that emissions from this sector will be reduced by more than 13 million tonnes of CO2 equivalent between 2019 and 2030.

   In addition, in line with European policy, embodied through elements such as the European Commission Communication "Towards ambitious industrial carbon management in the EU" or the Net-Zero Industry Act adopted by Regulation (EU) 2024/1735, the role of CO2 capture, storage and use$_{technologies}$ targeting hard-to-abate industrial sectors, such as process emissions, is envisaged without discouraging decarbonisation by moving away from fossil fuels.

10. Renewable gases**are boosted: renewable hydrogen and biogas**.

    Close to 2 030 GW of electrolysers for the production of renewable hydrogen, mainlyte, for industrial uses are expected in 12. The publication of the Hydrogen Roadmap in Spain and the instruments deployed, strategies at European level and the growing need to decarbonise industry allow for a path towards a substantial contribution of this energy carrier by the end of the decade. **The 12 GW path also represents an increase on the first estimates in the Hydrogen Roadmap, which set a target of 4 GW of electrolysis by 2030, and on the estimates in the draft NECP of June 2023, which envisaged 11 GW**.

    Biogas and biomethane production is also increased, by harnessing the available potential, from different sources, and generating significant synergies with the private sector. **The forecast of biogas is twice as high as the Biogas Roadmap, reaching 20 TWh in 2030**.

11. **It deepens changes in transport and mobility by enhancing healthier, more inclusive and more inclusiveways of life**.

    This update of the NECP represents a reinforced commitment to sustainable transport and mobility, taking advantage of the progress made in recent years in this area in Spain and the impetus provided by the Segu, Sustainable and Connected Mobility Strategy 2030, the Recovery Plan, the draft Sustainable Mobility Law and Royal Decree 1052/2022 of 27 December regulating low-emission zones (LEZs), which aims to regulate the minimum requirements that local authorities must meet in accordance with Article 14 (3) of Law 7/2021 of 20 May on climate change and energy transition. The transformation of cities is deepened with the deployment of pedestrian areas and routes and the promotion of cycling with the construction of cycle lanes, the adaptation of roads and urban space, the provision of safe parking and the deploymentof bike rental servi or measures to calm road traffic.

    The focus on public and collective transport is also reinforced, with specific measures relating to the rail sector as a novelty compared to the PNIEC 2021-2030, as well as specific measures to boost digitalisation and sustainability as measures for competitiveness and efficiency in the transport sector.

    The electric vehicle fleet is also increased to 5.5 million in 2030, accompanied by a roll-out of charging infrastructure.

12. **Strengthening energy renovation**, increasing the number of dwellings renovated until 1.377.000,by leveraging the PRTR investments and a new regulatory framework around the Energy Efficiency in Buildings Directive.

Sector and technology objectives

2030	PNIEC 2020/ Roadmaps	NECP 2023

Wind Including offshore wind	50 GW 1-3 GW	62 GW 3 GW
Solar FV Including Self-Consumption	39 GW 9-14 GW	76 GW 19 GW
Renewable hydrogen: electrolyser power	4 GW	12 GW
Biogas	10.4 TWh	20 TWh
Storage	20 GW	22.5 GW
Building efficiency. Refurbishment of dwellings	1.200.000	1.377.000
Electric vehicle	5 million	5.5 million
Electrification (% over final energy)	32 %	35 %
Electricity demand (vs 2019)	+ 5 %	+ 34 %

13. **Strategic autonomy in the industrial value chain for the energy transition becomes central**. Technological and industrial opportunities in the value chain are boosted, in line with the addendum to the Recovery Plan and the reinforced need following the war in Ukraine. Specifically, Investment 3 of the PRTR Component 31 in the industrial value chain will also contribute to greater open strategic autonomy by creating or strengthening industrial fabric in key sectors such as renewables and their storage, which reduce Spain's and the EU's exposure to potential failures in the supply of critical materials and equipment for the energy transition.

    In particular, measures of an industrial nature are strengthened, both those related to the above mentioned boost in the value chain and those supporting the decarbonisation of industry, where improving energy efficiency

, the use of renewable sources and the circular economy strengthen competitiveness in the medium and long term. These measures are aligned with the Green Deal Industrial Plan Communication published by the European Commission in February 2023, and with Regulation (EU) 2024/1735 establishing a framework of measures for strengthening Europe's Net-Zero Technology Manufacturing Ecosystem (NZIA).

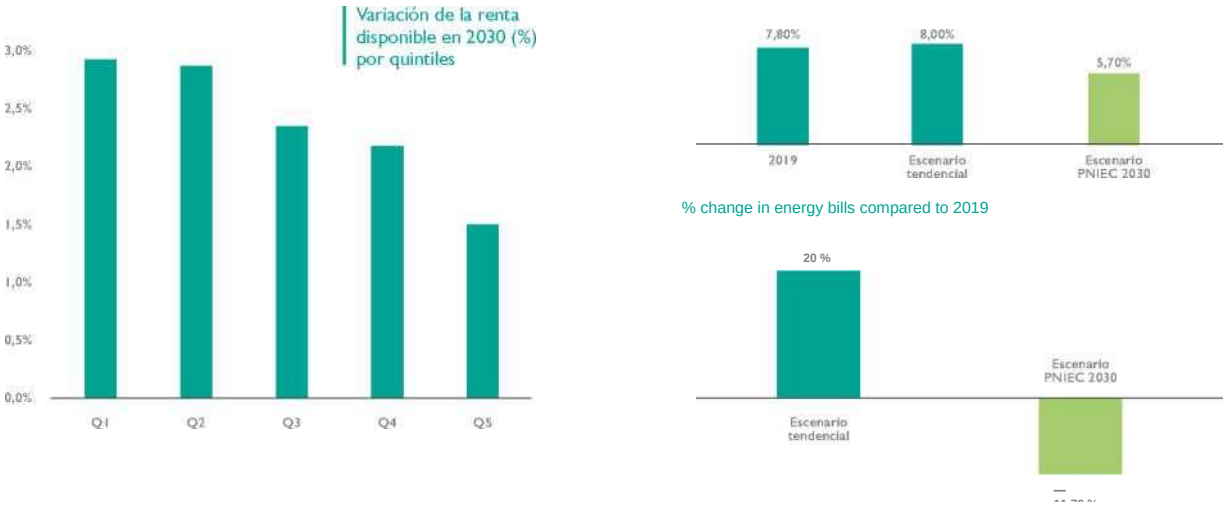
In addition, the Government is processing the draft Law on Industry and Strategic Autonomy, whichwill promote Spain's reindustrialisation and greater strategic autonomy, taking advantage of thelogical transition as a lever for competitiveness. To this end, the law will boost the net-zero industry, strengthening productive capacities and the value chain associated with the energy transition and decarbonisation of the economy, in line with the European Commission's Green Deal Industrial Plan, the National Energy and Climate Plan, the Long-Term Decarbonisation Strategy and the Spanish Circular Economy Strategy.

In short, this law aims to restore Spain's industrial base, increase its competitiveness and sustainability, and contribute to greater strategic autonomy of the Spanish economy. This is done by promoting investment in the development of clean technologies, process decarbonisation and the manufacturing of net-zero products, in line with the objectives of the European Union and Spain to achieve climate neutrality by 2050.

14. The enhancement of greenhouse gas removals from both agricultural and fores sinks is encouraged tocontribute to meeting the objectives of the Paris Agreement and to achieve the objective of climate neutrality by 2050 at the latest.

In line with numerous studies at international level12, which conclude that the energy transition is an important opportunity in terms of economic development and social well-being, the implementation**of the new Plan will reinforce the positive social, economic, health and redistributive impacts**, thanks to the plannedinvestment and the strengthening of the economic benefits of reducing energy dependence onthe economy as a whole.

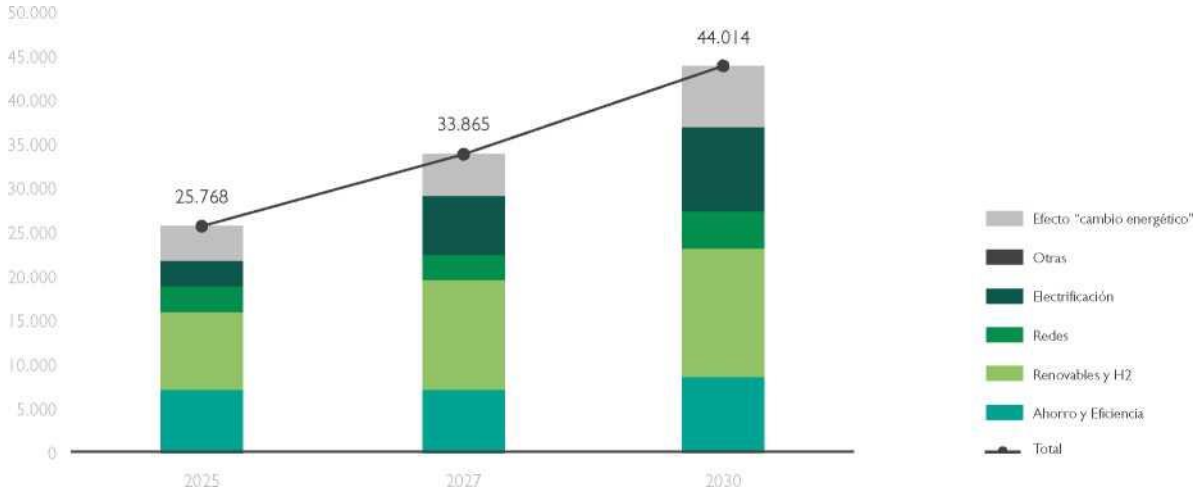
Energy bills decrease and household disposable income increases



12 IEA (2023) Technology Energy Perspectives, International Energy Agency, Paris; IRENA (2018). Global energy transformation: A roadmap to 2050, International Renewable Energy Agency; OECD (2017). Investing in Climate, Investing in Growth, Organisation for Economic Co-operation and Development, Paris;

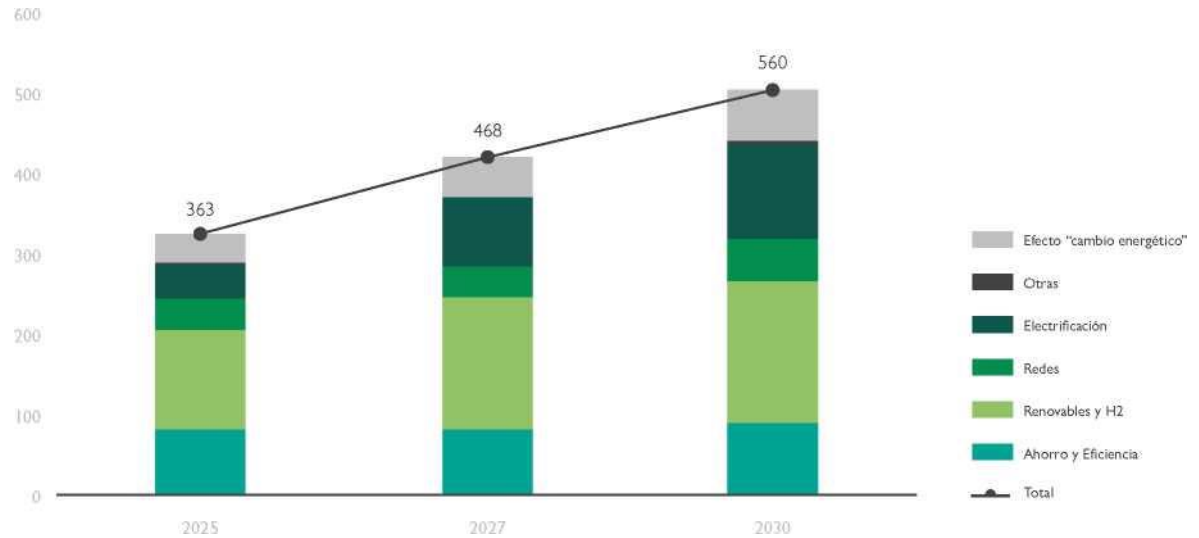
The contribution of the NECP to GDP will be very positive, generating an annual increase in GDP of EUR 44.000 billion in 2030. Reducing energy imports leads to savings of EUR 86.750 billion in the trade balance.

GDP would increase between EUR 25.700 billion and EUR 44.000 billion between 2025 and 2030
This represents an increase of 3.2 % in 2030 compared to the scenario
trend (PNIEC-2: increase between 16.500 and 25.700 MEUR + 1.8 %)



The net job creation opportunity is strengthened, rising to 560.000 jobs in 2030, above the 348.000 new jobs foreseen in the 2021-2030 NECP.

Employment would increase by between **363.000** and **560.000** jobs in 2025 and 2030, respectively, compared to the baseline scenario (PNIEC-21: increase of between 253.000 and 348.000 jobs)



Finally, reductions in air pollutants lead to **a reduction of more than 5.800 premature deaths due to air pollution by** 2030, from 11.952 premature deaths in 2019 (according to WHO/IHME) to 6.095 in 2030.

To achieve these benefits, the measures foreseen in the NECP have been extended and strengthened. This update therefore increases the number of measures of the 78 measures contained in the 2021-2030 NECP to reach **110 measures**. In turn, the initially

planned measures have been updated and deepened on some of their elements, building on the progress achieved and lessons learned since the publication of the NECP 2021-2030 as well as the increasedawareness and coordination of the various actors.

According to the Regulation on Governance for the Energy Union and Climate Action, the objectives and policies and measures needed to achieve them are structured around the **five dimensions** of climate and energy, summarised below, to which, as mentioned above, **a cross-cutting component is incorporated, with elements contributing to all or several of the five previously established dimensions, which reinforce the overall coherence of the Plan, as well as a socio-economic impact analysis chapter**.

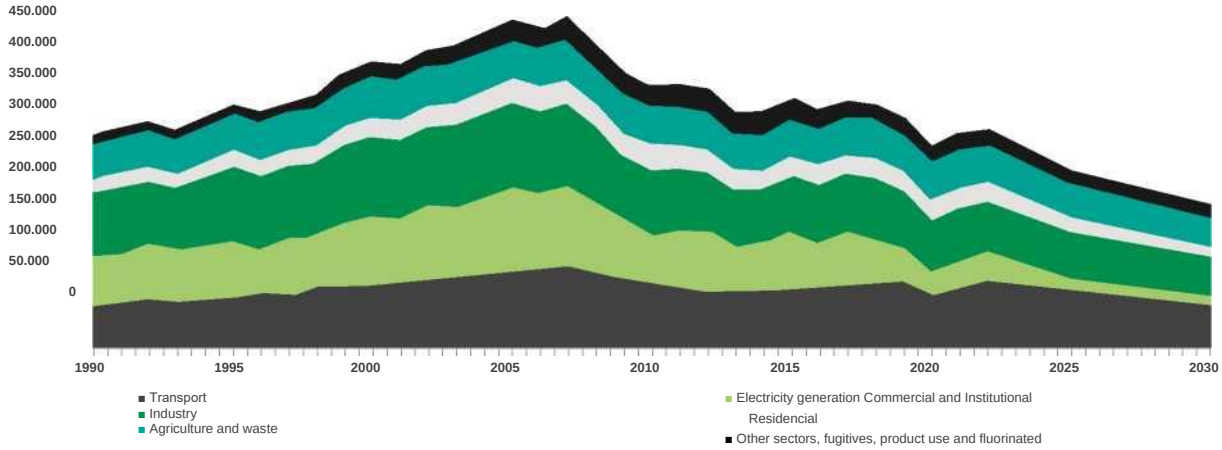
Decarbonising the economy and advancing renewables

According to the plan's forecast, the measures set out in the Plan will lead to a 32 % reduction in greenhouse gas emissions by 2030 compared to 1990 levels, representing a 55 % reduction in 2005 levels. This represents an increase of more than a third compared to the forecast in the first edition of the NECP, which set the emission reduction by 2030 at 23 %. This path is consistent with the long-term objective of **making Spain a climate-neutral country by 2050**.

Diffuse sectors (residential, transport, agriculture, waste, F-gases and non-tradingindustry) contribute to this objective with a 2030 mitigation of 42 % compared to 2005 levels, while ETS sectors do so with a decrease of 70 % compared to 2005.

The measures in **the 2023-2030 NECP bring total gross GHG emissions from 309,8 $MtCO_2eq$ in 2019 to 195,2 $MtCO_2eq$ in 2030**.

1 out of 2 tonnes of CO_2 are mitigated since 2005



The sectors of the economy which, in absolute terms, reduce emissions in that period are those of trica generation(**32 $MtCO_2eq$**), dominated by a strong penetration of renewable generation, as well as mobility and transport (**32 $MtCO_2eq$**), mainly thanks to modal shift and the focus on public transport and rail, support for improving the efficiency and digitalisation of transport, as well as the penetration of electric vehicles and the use of advanced biofuels. These are compounded by industry (combustion) and the residential, commercial and institutional sector with further decreases **of 19 and 11$_{MtCO\ 2}$eq respectively**.

The plan foresees a total installed power in the electricity sector of 2030 **GW by 214,** of which **160 GW is renewable generation, and 22.5 GW of storage, with daily and weekly capacity rising to 12.5 GW and seasonal to 10 GW. The**distribution between different technologies is indicative and will depend on technological developments, costs, availability and integration capacity of different technologies. As an initial estimate, 62 GW is expected to be wind energy, including 3 GW of *offshore* wind; 76 GW solar PV, including 19 GW of self-consumption, which has a very important role to play; 14.5 GW of hydraulic power; 4.8 GW solar thermoelectric; there are alsocontributions from other renewable generation technologies. For non-renewable technologies, 203 026.6 GW of combined gas cycles and 3 GW of nuclear power stations are expected, all of which are already existing plants.

Renewable electricity generation in 2030 will be 81 % of the total consistent with a trajectory towards a 100% renewable electricity

sector in 2050. In a high renewable penetration scenario, it will be essential to have elements that give **flexibility** to the system, contributing to quality and security of supply. **In this regard, this update of the NECP highlights a stronger focus on energy storage and/or demand-side management** with specificprovisions, which will be key to enabling the further integration of renewable generation into the system. In addition, the update of the NECP incorporates measures to ensure that the deployment of renewables is made in a manner compatible with the territory, taking into account both cooperation with territorial administrations and the creationof difficulties for local communities.

Annex D to the Plan sets out the reports with the 2030 generation dispatch simulations carried out byRed Eléctrica de España (REE).

Similarly, the plan's forecast for 2030 is that **renewables in the final use of energy will be 48 % higher than in the** previous plan, which was expected to reach 42 % of renewables in 2030. This result is, on the one hand, the high penetration of electric and thermal renewables in all sectors of the economy, including self-consumption or decarbonisation of industry, greater flexibility, greater involvementof citizens in the energy system, and specific support measures in areas where it is needed. On the other hand, it is also a consequence of the reduction in the amount of final energy needed in the economy as a result of progress in saving and energy efficiency in all sectors.

In addition, self-consumption and distributed generation, demand-side management, the promotion of energy communities and specific measures to promote the proactive role of citizens in decarbonisation are expected to increase the diversity of actors and services, and the existence of projects involved, both in activities related to the generation of renewable energy and its storage, as well as in demand management and increased flexibility across the energy system. Significant progress has already been seen in these areas since the publication of the first NECP, which is expected to be consolidated and intensified over the decade as foreseen in this update.

Beyond energy actions, the Plan addresses the need to tackle emissions in the non-energy **sectors,** as well as to harness the potential of GHG removals by natural sinks. The Plan proposes measures to meet Spain's commitments for non-energy diffuse sectors up to 2030. Within the diffuse sectors, the waste management, agriculture and livestock farming, and fluorinated gases (non-energy diffuse) sectors will contribute with a reduction in 2030 compared to their 2005 levels of approximately 26.6 %, 18.6 % and 65.2 % respectively.

To this end, measures such as the development of fertilisation plans, the promotion of crop rotations and the covering of slurry ponds are highlighted in the agriculture and livestock sector. In the waste sector, attention should be drawn to actions aimed at reducing the amount of bio-waste that is landfilled, suchas selective recycling, composting, biomethanisation and the reduction of food waste. All this within the framework of the CAP 2023-2027, which gives greater flexibility in the implementation of these measures. The F-gas sector, for its part, includes measures to promote the use of low or zero global warming potential refrigerants and the recovery and proper management of F-gases at the end of life of equipmentusing F-gases. Finally, the plan includes actions designed to encourage the increase of removals from agricultural and forestry sinks.

In particular, the measures proposed in the diffuse sectors have been reviewed in line with the regulatory developments that have taken place since the adoption of the 2021-2030 NECP, notably: the adoption of the CAP Strategic Plan for the period 2023-2027 under the agricultural and livestock sector measure; in the waste sector, Law 7/2022 on waste and contaminated soil for a circular economy and Royal Decree 646/2020 regulating landfilling; the adoption of Regulation (EU) 2024/573 on fluorinated greenhouse gases (F-gases); amending Regulation 2018/841 on greenhouse gas emissions and removals from land use, land use change and forestry to the extent offorest sinks; and the carbon farming eco-schemes of the CAP Strategic Plan to the extent of agricultural sinks.

It should also be noted that the Plan incorporates a new measure that specifies and spells out the synergistic relationships between the NECP and the National Climate Adaptation Plan to integrate adaptation objectives into energy and climate planning.

Finally, the NECP sets out the contribution of the land use, land use change and forestry (LULUCF) sector to the climate neutrality objective, and to the 2030 greenhouse gas emission reduction target. It is expected that these objectives will be met, as well as the new objective introduced by Regulation 2018/841 using the flexibilities allowed by the regulation, by implementing the measures provided for in the NECP to encourage the increase of removals from both agricultural and forestry sinks and to prevent their loss. These measures translate into actions such as sustainable forest management, restocking, direct seeding, plant cover and measures to combat

forest fires, among others.

To achieve these results, the Decarbonisation dimension incorporates 37 measures, related to the deployment and integration of renewable energy, emission reductions through various mechanisms, reduction of these emissions through increased sinks, as well as other cross-cutting issues, either through taxation or the social dimension of the energy transition.

This dimension includes two measures to ensure full compatibility of renewable deployment with biodiversity, territory and rural development. The updated plan addresses key aspects in the transformation and flexibility of the energy system with measures linked to the promotion of innovative renewables, energy storage and demand-side management. At sectoral level, progress has been made on the industrial decarbonisation measure, as well as on those associated with transport and its modes.

Energy efficiency

The 'First, Energy Efficiency' principle is one of the guiding principles of this Plan. Reducing the 'energy intensity' of the economy makes it possible to maintain or increase welfare and economic activity while reducing energy consumption in absolute terms.

In this regard, Directive (EU) 2023/1791 on energy efficiency (EED) sets a binding target for improving energy efficiency at EU level of 38 % in terms of final energy consumption13, compared to thereference European reference. **The measures set out in this Plan will significantly overcome this objection, leading to an energy efficiency improvement of 43 %**. To help reduce energy consumption, the Directive specifically sets energy savings targets for Member States, including a trajectory for achieving annual savings in terms of final energy of 1.3 % in 2024 and 2025, 1.5 % in 2026 and 2027 and 1.9 % in 2028, 2029 and 2030 (always compared to the average consumption of the years 2016 to 2018).

To achieve these objectives, the plan incorporates 23 measures to increase energy efficiency in all sectors, largely thanks to the momentum of the reforms and investments of the recovery and resilienceplan and the progress made in the years. In particular, at sectoral level, this update includes new measures on modal shift in freight transport and on the efficiency of the port and fisheries sector. Measures addressing efficiency in industrial processes, as well as in agricul, and in the residential andtertiary sectors, are also maintained and strengthened.

The Plan proposes that **the public administrations be exemplary in terms of energy saving and efficiency**. Thus, it sets out initiatives to meet the objectives set out in the recast Energy Efficiency Directive to14 renovate the public building stock (3 % per year) and to reduce the consumption of public bodies (1.9 % per year in terms of final energy compared to the value of 2021), in both cases the objectives concern not only the General State Administration, but also the Autonomous Communities and local authorities. Among others, **energy contracts** will be one of the mechanisms that will enable such actions in the public sector.

The Plan calls for a greater modal shift both in urban areas – boosting collective public transport and active mobility for everyday travel – and in the area of freight, with a renewed and specific commitment to a **greater presence of rail**, including the expansion and improvement of intermodal connections, particularly land/port connections. **Greater penetration of technologies such as killer pumps or thermal renewablesis** also promoted, in particular through **heating and cooling networks** for which a new measure is dedicated**. In**addition, **the projected energy renovation of the existing housing stock** until 1.377.000 is raised, largely driven by the Recovery, Transformation and Resilience Plan.

As a novelty in this update, **improvements are planned in technology and systems for managing energy-intensivetrias,** as a tool not only for meeting energy and climate objectives, but also as a **key lever for the competitiveness of the industrial sector** and calls for the consolidation and strengthening of this area of the economy.

13 Not including non-energy uses.

14Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) No 2023/955 (recast)

By including a new measure, the use of **Energy Saving Certificates (CAE)**, which promotes investments in energy efficiency actions in different sectors and represents an important alternative to aid programmes and other support mechanisms, is also included as a tool that enhances weight in this update of the NECP.

Energy security

Russia's invasion of Ukraine has highlighted the centrality of energy security, revealing the vulnerability of external energy dependence in terms of prices, trust and availability of SumiNistro. This challenge has mobilised extraordinary work on European energy policy, both in terms of the pace of adoption of new regulation and the scope of the measures. Thus, the European Commission's Communication, REPowerEU, "seeks to rapidly reduce our dependence on Russian fossil fuels by accelerating the clean energy transition and joining forces for a more resilient energy system and a true Energy Union"15.

In view of the increasing geopolitical tensions and markets, the Plan + SE (Plan More Energy Security) has been articulated to provide more security against energy prices for households and the wider economy,and to help increase the European Union's security of supply. It is a plan with rapid impact measures targeting winter 2022/2023, many of them protracted, together with measures that contribute to a structural strengthening of this energy security.

The 2021-2030 NECP already considered the need for and benefits of increasing energy independence, both because of the reduction in energy bills and savings on the trade balance, and because of the reduction in vulnerabilityresulting from dependence on fuel imports, with the associated price volatility. This Plan continues toensure a secure, clean and efficient supply of energy to the various consumption sectors, which needs to be addressed from the different levels of energy security:

- Increasing the protection of vulnerable consumers
- Reduction of dependency, in particular the import of fossil fuels
- Diversification of energy sources and supply
- Preparedness for possible supply constraints and disruptions
- Increasing the flexibility of the national energy system

Following the implementation of the measures included in this Plan, renewable and efficiency actions **will improve external energy independence from 27 % in 2019 to 50 % in 2030, which, in** addition to improving national energy security, will have a very favourable impact on the trade balance, assuming **savings of more than EUR 86.000 billion in imports**. This almost doubled the impact on the increase in external energy independence projected in the previous edition of the Plan, improving by 11 percentage points in 2030.

Security of **electricity supply is at the heart of energy security**. **The analysiscarried out by the System Operator, detailed in Annex D to the Plan, shows that the security of electricity supply of the *generation mix* presented in this plan is guaranteed**.

With regard to the security of electricity supply, it should be noted that:

First, the electricity generation withdrawn is compensated by the significant penetration of renewable tricageneration technologies, in particular solar and wind generation.

Secondly, Spain has developed a strong commitment to energy storage as set out both in the Energy Storage Strategy and in 'Component 8: Electricity infrastructure, promotion of smart grids and deployment of flexibility and storage" of the PRTR. The latter also promotes the use of other forms of flexibility such as demand-side management. These technologies will be key to integrate the

15 Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions

renewable production collected in the scenarios of this plan.

Third, the electricity market reform, consisting of Regulation (EU) 2024/1747 and Directive (EU) 2024/1711, will be key to provide the right signals to accelerate investments in renewables, storage and demand-side management. To this end, the development of capacity markets and the development of specific instruments to promote greater flexibility in the electricity system will be particularly important.

Finally, the above-mentioned REE reports conclude that there are full guarantees of supply in the Scenario, which istemperate in this Plan in the various climate scenarios.

In turn, and in line with the objective of climate neutrality by 2050, the Plan envisages the need to anticipate and plan, together with the System Operator, the technologies, procedures and mechanisms to ensure thatthe supply of zero greenhouse gas emissions takes place.

The work strands included in this dimension of the Plan are as follows:

- Implement the Plan + SE, which sets out three key objectives:

  — Increase protection for vulnerable consumers, households and businesses, in addition to the measures already taken. Both energy saving and renewable substitution measures and specific consumer support measures contribute to this.

  — Strengthen strategic and energy autonomy by putting in place additional measures to accelerate the staticcultural changes already underway in the context of the Strategic Energy and Climate Framework.

  — Solidarity with other Member States. Cooperation and solidarity are the foundations of the European project, making each of its members stronger. Thus, maximising the use of existing infrastructure per seis an important exercise of energy solidarity with the EU as a whole. In addition, it must be ensured that any new infrastructure is compatible with medium and long-term decarbonisation objectives.

- Strengthen the provision of strategic raw materials for the energy transition.

- To promote the various technologies and services that provide flexibility, such as energy storage andthe demand side.

- Increase the interconnection of electricity systems, which will help reduce potential negative impacts due to supply constraints or interruptions (see Internal Market section).

- To deepen preparedness for contingencies, which are currently very advanced, in the various areasin which Spain is committed to:

- In the case of the International Energy Agency (IEA), important steps have recently been taken with the creation, for example, of a Gas Task Force.

- At European level, although various urgent rules have been adopted in 2022 to deal with the crisis situation, this preparation has been moved forward at national level by updating and approving the majorrisks, the Preventive Action Plan and the Emergency Plan, as well as any additional issues that may arise from the various EU directives and regulations for the electricity and gas sectors,Regulation (EU) 2024/1747 and Directive (EU) 2024/1711 having been adopted for the electricity sector, Regulation (EU) 2024/1789 and Directive (EU) 2024/1788 for renewable gas, natural gas and hydrogen.

- Reducing energy dependency on islands, for which sustainable energy strategies are keyfor each archipelago.

- Develop the National Security Strategy and the Energy Security Strategy, highlighting theneed to strengthen cybersecurity in the energy field by improving capacities to prevent, detect and respond to cyber-attacks to ensure the safe use of energy systems.

- Promotion of own technological capacities that reduce the EU's current dependence, by including specific criteria in auctions and support lines.

Internal energy market

The objectives corresponding to the Internal Energy Market dimension of the Plan address the need for a more competitive, transparent, flexible and non-discriminatory market with a high degree of interconnection that promotes cross-border trade and contributes to energy security. This requires that consumers, in particular vulnerableconsumers, be given the appropriate means, as well as increased competition and effective integration into the European market, with the relevant infrastructure.

The progress of renewable development, as well as the behaviour of the current European electricity market in situations of stress, such as price volatility, have shown that the current market design is not effectivein achieving decarbonisation ob and in responding to price tightening situations. It was therefore necessary to launch a European debate with a view to undertaking a reform of the electricity market. In advance, and as atemporary solution, in the case of Spain and Portugal, the so-called Iberian mechanism was developed, which aims to reduce the impact on prices perceived by final consumers in a context of high volatility, where a low level of interconnections is unique. As a result, the new electricity market design has been approved at European level and has three main objectives:

- The first objective is to ensure competitive and fair prices, reflecting generation costs. This first objective is essential to achieve an efficient and just energy transition, which guarantees households a sequi sustainableaccess to electricity, and incentivises the necessary investments in the electrification of our economy. Adicionalmente, achieving competitive prices is essential for European industry to compete on an equal footing on international markets.

- Secondly, the market should incentivise the necessary investments in renewables to meetdecarbonisation objectives in the most efficient way. To this end, negotiations are underway to facilitate access to long-term contracts by removing market barriers to the development of long-term contracts (PPAs) and removing regulatory barriers to the development of Contracts for Difference (CFDs), thus giving certainty to renewable energy investors.

- Thirdly, to incentivise the necessary investments in technologies that provide the necessary flexibility to the electricity system to accommodate the growing intermittent renewable production, various mechanisms are being considered to facilitate the development of technologies such as storage or demand response.

As regards electricity infrastructure, the integration of renewable generation makes it necessary to adapt transmission and distribution lines on national territory, including mainland connections, non-peninsular systems and interconnections between island systems. The Plan deals with all these aspects, as well as the development of non-manageable flexibility, management and storage mechanisms for renewable electricity to effectively integrate energy from renewable sources.

In this regard, as a development of the 2021-2030 PNIEC, the 2021-2026Electricity Engeing Transport Network Development Plan has been approved. The implementation of the infrastructure associated with this 21-26 Planning will prepare the transmission network so that it will be able to connect and integrate more renewable energy in the coming years. Thanks to its development, in 2026, 67 % of electricity generation will come from green sources. The planning design has been based on compliance and the generation and demand scenarios of the 2021-2030 NECP, applying an integrated perspective and coordingnothing with this strategic planning. In addition, as already provided for in the More Energy Security Plan, with the aim of adding flexibility to electricity planning and strengthening the capacity to anticipate and adapt to the challenges of the energy transition, the amendment to the Plan for the Development of the Electricity Transmission Network 2021-2026 has been published to make projects viable in the short term. Furthermore, work has started on a new Planifi caciónfor the period 2025-2030 with the publication of Order TED/1375/2023 of 21 December, initiating the procedure for drawing up proposals for the development of the electricity transmission network with a 2030 horizon.

Moreover, increased interconnections within non-peninsular electricity systems will have a dire impact onenergy and climate, facilitating further integration of renewable generation and strengthening security of supply.

At Community level, the level of interconnection of the Iberian electricity system with the rest of the European continent falls short of the objectives set, and it will therefore be necessary to further develop new interconnections.

The new interconnection with Portugal will allow to increase the exchange capacity to 4.000 MW. For new interconnections with France, interconnection capacity will increase to 5.000 MW in 2030 thanks to the Bayof Biscay injection Pro: between Aquitaine (FR) and the Basque Country (ES). The planned interconnections between Aragon (ES) and Pyrénées-Atlantiques (FR) and between Navarra (ES) and Landas (FR) are estimated to be operational by the end of 2035, increasing our interconnection to 8.000 MW.

The Plan foresees continued regional cooperation with neighbouring countries in the areas of at least energy security and internal market. Cooperation initiatives developed in recent years with EU Member States have been included in this regard.

The Plan promotes various measures to protect and strengthen the role of consumers. As regards poverty, the Plan integrates the provisions of the **National Strategy against Energy Poverty**16 approved by the Council of Ministers on 5 April 2019, which is the instrument for tackling energy povertyfrom a comprehensive and medium- to long-term perspective. Over the period 2019-2023, the measures set out inthe Strategy have been well implemented, but in addition a number of extraordinary measures have been taken to protect the most vulnerable consumers in the face of two extremely impactful events such as the COVID-19 health crisis and the Russian invasion of Ukraine: the reinforcement of measures such as those linked to the electricity social bond or the adoption of new measures, such as the creation of the 'minimum vital supply', have allowed households considered to be vulnerable and severely vulnerable benefiting from the social bond to pay 17 % and 28 % less respectively in 2022 compared to 2021 for their annual light bill, thereby strengthening the social shield for people in situations of energy vulnerability.

Research, innovation and competitiveness

The Ministry of Science, Innovation and Universities (MICIU) is responsible for proposing and implementing the Spanish Government's policy on scientific research, technological development and innovation in all sectors and is therefore responsible for developing this dimension in the energy and climate sector in coordination with the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) and the other ministerial departments with R & D & I actions.in addition to its funding agencies and its attached bodies, including the State Research Agency, the Centre for Technological Development and Innovation (CDTI) and the Public Research Bodies (OPIs), and in particular in the field of energy and climate, the Centre for Energy, Environmental and Technological Research (CIEMAT) and the National Agency for Scientific Research (CSIC).

This dimension of the plan falls under the umbrella of the **Spanish Strategy for Science, Technology and Innovation (EECTI 2021-2027)**, which is the strategic planning tool for achieving the objectives proposed in the field of R & D & I and the State Plans for Scientific, Technical and Innovation Research (PEICTI) which develop them at national level, currently PEICTI 2024-2027.

Actions to promote R & D & I in the field of energy and climate are structured along the following strategic lines:

- Energy transition and decarbonisation
- Smart and sustainable mobility
- Smart and sustainable cities and ecosystems
- Fair and inclusive energy transition

Moreover, in the field of energy, the **Strategic Energy Technology Plan** (**SETPlan**), which has been the R & D & I pillar of European energy policy since 2007, has played a leading role.

16National Strategy against Energy Poverty 2019-2024

In terms of competitiveness, Spain is one of the European countries with the highest potential for usingrenewable energy: it is the country with the highest solar resource across Europe and is among the countries with the highest wind resource. This makes the generation of renewable energy in Spain at significantly lower prices than other energy carriers a reality, leading to greater competitiveness of the economy and improvement of households.

In 2023, the Green Deal Industrial Plan is presented as an instrument to improve the competitiveness of EU industryby creating a more enabling environment for scaling up the EU's manufacturing capacity for net-zero technologies and products needed to meet Europe's ambitious climate goals.

The NECP allows Spain to aspire to be one of the leading countries of the European Union in terms of energy transition, as has been shown by progress so far. This is a transformation in which the Spanish economy and society have much to gain in terms of competitiveness, taking the form of prosperity, energysecurity, generating industrial employment, innovation, technological development and the elimination of energy poverty.

Thus, the Plan ensures that the climate agenda is interconnected with other EU priorities:

- The **competitiveness of EU industry** to ensure strategic autonomy in the current geopolitical context
- Contributing to **social justice and bridging the inequality gap** by creating mechanisms to ensure a just transition for the most vulnerable
- **Climate change adaptation** of sectoral policies

Despite the changing global context, with specific features for Europe, the strategic frameworkdeveloped has provided certainty and credibility that has enabled the green transition to become a focal point of economic, social and environmental opportunity in Spain, acting as a lever for the modernisation and transformation of the production model.

Spain is already well positioned in part of the value chain and R & D & I capacities associated with the energy transition, from renewables, power electronics, storage or renewable hydrogen. As examples, **in the photovoltaic sector, the country has more than 60 % of the value chain, while in the wind sector this figure amounts to 90 % and places Spain as a third country of the European Union in investment in R & D.** To maximise the opportunities for this transition and strengthen the strategic autonomy of Spain and Europe in this area, it is necessary to strengthen the position of the sector in the areas in which it is already a leader. to strengthen those with less presence and improve the capacities for integrating these solutions into the productive fabric, so that their own design, research, development and innovation and manufacturing capacities and their deployment in their production system can contributeto the energy transition in Spain, Europe and globally. Advancing these actions will allow to contribute to theEuropean manufacturing ob of 40 % of zero-emission technologies in Europe, as set out in the 'Net-Zero Industry Act' published in June 2024.

The reduction of electricity costs through the use of renewable technologies will lead to aclear COM improvement for electricity-intensive businesses. It is worth highlighting the development of the PERTE forIndustrial Decarbonisation, which will make it possible to increase the presence of renewable energies in the industrial sector, both with the development of self-consumption, which is currently on the rise, and in the supply of renewable heat at medium to high temperature. In addition, this PERTE provides for the implementation of comprehensive energy efficiency plans in industrial sectors that are complementary to other measures, such as changes in production processes towards those withthe available techniques. The expected improvements in energy efficiency also have a positive impact on the industrial and productive fabric, on large, small and medium-sized enterprises, as well as on households and people.

Economic, employment, distributional and health impact of the NECP 2023-2030

The socio-economic and health impact analysis of the first NECP has already shown that the energy transition setout in this Plan represents an important economic and employment opportunity for our country. Recent international analyses coincide in this diagnosis.

For example, the OECD in its *Investing in Climate study, Investing in Growth*17 notes that complying with the Paris Agreement would immediately generate positive impacts and increase GDP in 2050 to 2.8 % on average in the G20 countries. Other studies such as IRENA *Global Energy Transformation*18 agree with the OECD on these positive impacts, noting that within the most beneficial G20 countries those

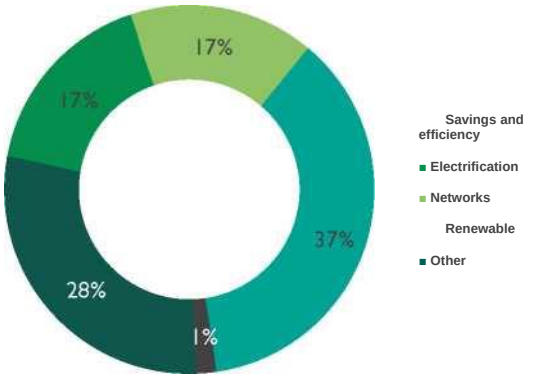
17Investing in Climate, Investing in Growth
18 GLOBAL ENERGY TRANSFORMATION. A road map to 2050

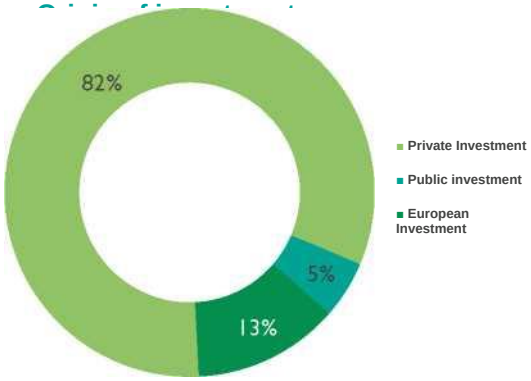
in southern Europe will be. Finally, and more recently, in its Technolo *gy Energy Perspectives 2023 report, the International Energy* Agency foresees that if the announced energy and climate commitments are met, global industrial jobs in energy transition will grow from 6 million jobs today to almost 14 million in 2030.

On the other hand, various industry associations have estimated the impact of the energy transition on the economy in recent years, coinciding with an important contribution in terms of job creation, gross value added andthe country's passive export performance.

Estimated total investments 2021-2 030 308.000 MEUR (PNIEC-21: EUR 241.000 MILLION)

Destination of investments





Source: BC3 and MITECO, 2023

The results obtained are determined by two main types of effects. The first effect comes from investments[19][20]. The NECP will mobilise a cumulative total investment of EUR 308.000 billion until 2030, a increase of 28 % compared to the original plan. These investments can be grouped by measures on renewables (37 %), energy savings and efficiency (28 %), electrification of the economy (17 %), networks (17 %) and measures for non-energy diffuse sectors (1 %). 82 % of the investments would be made by the private sector and 18 % by the public sector. Moreover, it is noteworthy that, thanks to the *Next Generation* EU funds and the PRTR, a significant proportion of public investments, 70 % of them, are financed by European funds.

The second is the effect of the 'energy change' which reflects the economic impulse resulting from (a) the savings generated in the-energy fac of businesses and households, freeing up resources for other types of expenditure and (b) the change in the energy *mix*, which replaces imported fossil fuels with indigenous renewable energies that reduce the price of energy (electricity) and generate a higher aggregate value within the country due to lower energy dependency on external sources.

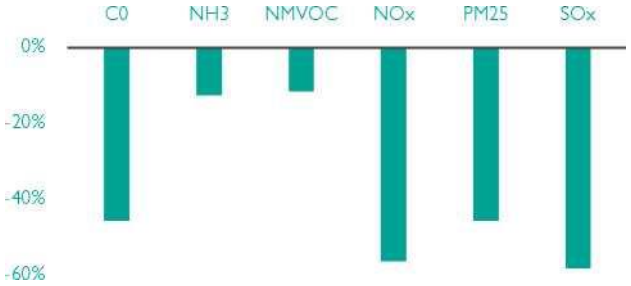
The combination of both effects explains the positive macroeconomic impact of the NECP resulting in an increase in GDP of EUR 44.000 billion in 2030 (+ 3.2 % in 2030 compared to the trend) and an increase in net employment of 560.000 jobs in 2030, which is 60 % higher than the increase projected in the NECP 2021-2030. The impacts on this new version of the NECP are more positive mainly because of the opportunity to mobilise more investment and because a larger part of the funding is European thanks to the PRTR, which does not draw resources from the budgets of national public administrations.

The additional investments**19** are estimated taking the investments of the NECP against a baseline scenario.
20 Renewables include investments linked to renewables dedicated to hydrogen, as well as investments in electrolysers.

Finally, the impacts on air quality and health have been analysed. The main air pollutants are significantly reduced compared to 2019, this is the case for PM2,5 (-45 %), SO2 (-57 %) or NOx (-56 %) emissions. The decrease in pollution results in a 49 % reduction in premature deaths by 2030, from 11.952 premature deaths in 2019 (according to WHO/IHME) to 6.095 in 2030.

Emissions of air pollutants are decreasing.
reduce premature deaths by 49 % in 2030 with
for 2019 (WHO/IHME)

% Change in air pollutants in 2030 compared to 2019



Muertes prematuras (nº personas)

Source: BC3

In addition, with regard to the protection of people's health from the adverse effects of extreme cold and heat, the Ministry of Health, in coordination with the Ministry for the Ecological Transition and the Demographic Challenge, launched in 2021 the Strategic Health and Environment Plan, which responds to the need to equip society withan appropriate management tool to address the major environmental challenges of our time, with a *One Health* approach. In the absence of climate change mitigation and adaptation policies, if temperature rise were to achieve a limit of 1.5 °C [reference of the Paris Agreement], the number of deaths associated with extreme heat in Europe would be reduced by two thirds from a 3 °C increase. It should be noted that estimates indicate that the largest increase in the number of heat-related deaths would occur in France, Italy and Spain[21].

As a conclusion of this exercise, the updated NECP allows Spain to be one of the leading countries of the European Union in the green transition. It is a transformation in which society and the Spanish economy have much to gain in terms of competitiveness, taking the form of prosperity, energy security, generating industrial employment, innovation, technological development and the elimination of energy poverty, increasing the positive impact of this process and expanding the social, economic, environmental and health benefits.

In addition, the 2023-2030 NECP is the tool that enables Spain to comply with its international commitments to reduce greenhouse gas emissions at both national and Europeanlevel, setting a path that is consistent with the objective of climate neutrality by 2050.

21Human mortality from extreme heat and cold

OVERVIEW OF THE CURRENT STATUS

1. OVERVIEW OF THE CURRENT SITUATION

The framework for climate and energy policy in Spain is determined by the international context and the policy of the European Union. Events in recent years, such as the COVID-19 pandemic or the energy crisis caused by Russia's invasion of Ukraine, have had a particular impact on the energy system as a whole, and have been accompanied by a cyclical response from different institutions and sectors. In the case of Spain, the Plan More Energy Security captures the relevant priorities and measures in this context.

However, this cyclical framework overlaps with a structural framework that remains fully in place. In this regard, highlights the Paris Agreement reached in 2015 which aims to contain the increase in the global average temperature to below 2 °C above the levels prevailing before the industrial revolution and to make efforts to limit it to 1.5 °C. However, in the conclusions of the mitigation report of the Sixth Assessment Cycleof the Climate Change Panel (IPCC), it is noted that the implementation of the policies implemented by the end of 2020 leads to projection scenarios that bring the global temperature to an average of 3.2 °C by 2100, while the implementation of the measures associated with the voluntary contributions of the Paris Agreement would bring the global temperature to 2.8 °C by 2100. The IPCC stresses that achieving climate-resilient development requires prioritising equity, social justice, inclusion and just transition processes and recalls that early action on climate change provides both short- and long-term benefits. More recently, COP 28 recognised that additional efforts are needed to meet the objectives of the Paris Agreement and limit global warming to 1.5 °C.

As a coherent response to both short-term and medium- and long-term short-term and structural challenges, the European Union has proposed an update of the regulatory and policy framework on energy and climate with a view to accelerating the energy transition, as a response to the climate crisis but also to the economic and social challenges arising from the high dependence on fossil fuels. At the international level, the actions proposed in the framework of COP 28, which concluded with an agreement pointing to the "end principle" of the fossil fuel era, are highlightedin objectives such as tripling renewable capacity by 2030, doubling energy efficiency improvements in 2030, accelerating efforts towards phasing out coal energy, phasing out inefficient fossil fuel subsidies, and other measures that drive the transition away from fossil fuels in energy systems, in a fair, orderly and equitable manner.

Furthermore, COP 28 encouraged Parties to come forward in the short term with ambitious economy-wide emissionreduction targets, aiming at full alignment at COP 30 with the objective of limiting global temperature increase to 1.5 °C.

1.1. Energy and Climate in the European Union

In December 2019, the European Union updated its 2030 climate and energy policy commitment, which was adopted by the European Council in October 2014 and included the target of reducing greenhouse gas emissions by 40 % compared to 1990 levels, **increasing it to a 55 % reduction.** These commitments were designed in line with the above-mentioned Paris Agreement, and with the objective of reaching climate neutrality for the EU by 2050, bothof which have been embodied in the European Climate Law, provides a framework for advancing efforts to mitigate and adapt to the impacts of climate change.

What started as a vision to make the European Union the first continent to achieve CLI neutrality by 2050 has becomethe world's most comprehensive set of regulations to decarbonise the economy and a set of benefits, for businesses, citizens and households, on the irreversible path of an energy transition, which is already taking place. In particular, as regards energy, in July 2021 the Euro pea Commissionpresented the 'Fit for 55' package of legislative proposals setting out a thorough revision of the directives and regulations that make up the current 'Clean Energy for All Europeans' package, addressing the reforms neededto achieve this new European Union emission reduction target for 2030.

More recently, in May 2022, in response to the difficulties and global energy market disruptions caused by Russia's invasion of Ukraine, in May 2022 the Commission presented the 'REPowerEU Plan'22, a plan to rapidly reduce dependence on Russian fossil fuels and advance the green transition, reinforcing certain targets and measures to achieve them. In particular, this plan strengthens the

REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition

diversification of gas supply sources to Europe, the electrification of the energy system and the transformation of the energy-intensive industry. Investingand innovation remains key to accelerate the necessary energy transition.

As a result of the negotiation of the 'Fit for 55' package and the 'REPowerEU Plan', agreements have been reached to increase the European ambition on renewable energy and energy efficiency. Theselegislative packages include as European targets for 2030, complementary to the overall emission reduction target, to achieve a 45 % share of renewable energy in total gross final energy consumption, as well as an improvement in energy efficiency by 38 % in final energy and 40.5 % in primary energy compared to the baseline 2007 scenario.

This process of negotiations has resulted in an increase in the ambition of a number of objectives of a sec naturethat support and contribute to achieving these broad objectives, and which have been embodied in the proposals for directives and regulations that make up this package. During the Spanish Presidency of the Council of the EU,in the afternoon of 2023, agreements were reached for most of the files making up the Fit for 55 package, as well as the definition of the EU common position at COP28. These agreements have resulted in the processing and adoption of most of the directives and regulations that will shape the context of the green transition in the coming years:

- Regulation and Directive on improving the Union's electricity market design
- Net-zero Industry Act (NZIA)
- Renewable Energy Directive (RED) and Energy Efficiency Directive (EED)
- Energy Efficiency of Buildings Directive (EPBD)
- EU Emissions Trading System (ETS) reform
- Updated EU rules to decarbonise gas markets and promote hydrogen
- New EU Emissions Trading System for building and road transport fuels
- Effort Sharing Regulation (ESR)
- Regulation on Land Use, Forestry and Agriculture (LULUCF)
- Regulation establishing a Social Climate Fund
- Cok emission standards for cars and vans
- Alternative Fuels Infrastructure Regulation (AFIR)
- ReFuel EU Aviation Regulation
- FuelEU Maritime Regulation
- Carbon Border Adjustment Mechanism (CBAM)
- EU Methane Regulation for the energy sector
- Regulation for the inclusion of maritime transport in the EU ETS
- Directive on aviation's contribution to the EU's emission reduction target

This implies the definition of new objectives and obligations to be transposed into national legislation in the medium tomedium term, although some of these objectives had already been taken into account when the draft of this Plan was drawn up and sent to the Commission on 28 June 2023.

In recent months, the EU has taken another important step in raising climate ambition, with the Communication 'Securing our future: Europe's 2040 climate target and the way towards CLIneutrality by 2050 by building a sustainable, fair and prosperous society ", which marks the launch of the process to set a 2040 target of reducing EU greenhouse gas emissions by 90 %.

Another key element is the flexibility of the electricity system. **In the flexibility report of the European Environment Agency and ACER regulator**: Flexibility*solutions to support a decarbonised and secure EU electricity system, published in September 2023, outline the key elements of the flexibility flexibility challenge for 2030) in an increasingly decarbonised EU electricity system and require Member States to assess and unlock the trend poolof flexibility resources such as, inter alia, demand response and regional cooperation to better anticipate and meet Member States'* flexibility needs, in particular by highlighting the importance of interconnections for this purpose. It is also stressed that improving Europe's energy security and fighting climate change are compatible objectives, but achieving them requires urgent changes to adapt the gene system, with the involvement of EU and national policy-makers, regulators, energy

network operators and users being crucial. The challenge of flexibility is important: in 2030, double the current flexibility will be needed, requiring a broad mix of flexible (clean) resources and supporting policies. The energy system needs to be adapted at scale to provide the right flexibility resources (both on the demand and supply side) to adjust to fluctuations in renewable electricity supply, encouraging the shift of the European energy system into two ways:

- Use coordinated planning and operation of the energy system to manage decarbonisation and security of supply at the same time, with regular assessments of flexibility needs at EU level and contribute tothe coordination of national NECPs, as well as biennial progress reports and projectionsof GHG emissions and facilitating optimisation and electrification across all sectors of the economy.

- Create incentives for consumers to actively adapt their consumption where necessary and for storage tofunction dynamically, maximising the potential of market signals, removing barriers to investment and maximising access to information for household and small business users so that they can make their energy choices more knowledgeable.

As regards the **planning of electricity grids**, the European Union is working intensively on redefining and adapting the regulatory framework. The decarbonisation targets for 2050 are a major challenge and entail a sharp increase in the electrification of the economy as a means of decarbonisation, and in turn thesechanges vote around the backbone of the system, which are electricity grids. The regulatory framework should be adapted to this new context to attract the necessary capital, thus ensuring that the energy transition targets are met.

In parallel, a number of reports have been published and a number of action plans have been developed which aimat the long-term, present and future development of electricity grids and the promotion of renewable energies.

With the aim of contributing to the delivery of the European Green Deal, the Commission presented in November 2023 **an Action Plan called “Networks: the missing link. EU Action Plan for Networks ", to ensure that our electricity grids operate more efficiently and are deployed further and faster**, with measures such as:

- Accelerating projects of common interest
- Improving the long-term planning of networks
- The introduction of regulatory mechanisms
- Better use, greater transparency and better network charges
- Improving access to finance for network projects, increasing the visibility ofEU funding programmes
- Speeding up the granting of permits for deployment
- Improving supply chains, harmonising manufacturing requirements for industry

The Action Plan is accompanied by a Commitment Pact to ensure the overall involvement of the parties involvedin the development of the networks.

Also included in the framework of the European Green Deal, as proposed by the European Commission in June 2022 under **the EU Biodiversity Strategy**, Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration andamending Regulation (EU) 2022/869 has just been adopted.

Another important element of the measures taken at EU level is **the European Wind Power Action Plan**, presented in October 2023, to ensure that the clean energy transition goes hand in hand with industrial competitiveness and that wind energy remains a European success story.

This plan will contribute to maintaining a healthy and competitive wind energy supply chain, with aclear and stable portfolio of proyets, attracting the necessary funding and competing on a global level playing field and is accompanied bya Communication on delivering on the EU’s offshore renewable energy ambitions, including wind energy, which follows up on the EU’s Offshore Renewable Energy Strategy adopted three years ago. This plan sets out immediate actions to be taken jointly by the Commission, Member States and industry, building on existing policies and legislation and paying particular attention to six main areas:

Acceleration of deployment through increased predictability and faster permitting.

- The Accele-RES initiative, together with Member States, to ensure the swift implementation of the revised EU rules on renewable energy and to pay more attention to the digitalisation of permitting processes and technical assistance to Member States.

- Improved auction design, with well-designed and objective criteria that reward the highest added-value equipment and ensure that projects are fully and timely implemented.

- Access to finance, in particular through the Innovation Fund or EIB guarantees for risk reduction.

- Promoting a fair and competitive international environment, to ensure that the wind sector can operate on a level playing field and monitor unfair trading practices.

- The creation of the Extended Renewable Energy Skills Partnerships will also facilitate the launch of European Net-Zero Industry Academies, including one dedicated to the wind sector,to support Member States' actions to upskill and reskill workers. The academies will develop learning content and materials and will aim to train 100.000 learners within three years of establishment.

- Industry engagement and Member States' commitments: the creation of an EU Wind Charter aimsto improve the favourable conditions and keep the European wind industry competitive.

Finally, on 30 May 2024, the Council of the European Union adopted conclusions entitled 'Promoting sustainable electricity network infrastructure'.

These include, inter alia, the following:

- The European Green Deal

- REPowerEU

- The European Council conclusions of April 2024 underlining the importance of achieving a genuine energy union, which requires, inter alia, significant deployment of, and substantial investments in, networks, storageand interconnection;

- The importance of electricity interconnections and trans-European energy networks

- The report of the European Environment Agency of 11 March 2024 entitled 'European climaterisk assessment' and the Commission communication of 12 March 2024 entitled 'Climate risk management: protecting people and prosperity', which emphasises the need to strengthen Member States' climate risk planning in the energy sector, as climate change will continue to put considerable pressure on Europe's energy infrastructure

- The Commission Communication of February 2024 on the 2040 climate target and the way toclimate neu trality by 2050 and the related impact assessment, which refers, inter alia, to the necessary investment in networks due to the increasing electrification of our economies;

- A number of measures are proposed to establish an interconnected and sustainable electricity grid in Europe, ensure energy security and achieve decarbonisation in the EU:

  — Electricity network infrastructure needs to be planned at European level in a coordinated and long-term manner, in particular in order to address the growing difficulties posed by network congestion. This planning shouldbe linked to bottom-up coordination of national plans at regional level and take into account the particular ritiesof regions that are not interconnected or insufficiently interconnected.

— A genuine Energy Union must be achieved, and urges the Commission to present a revised framework to ensure thatthe process of planning and phasing in the network is in line with the EU's climate and energy objectives. The aim is to increase the transparency and traceability of the entire process of planning and developing the electricity transmission system.

— Security and resilience of the European energy system. Cooperation with entities at all levels should be strengthened, with a particular focus on hybrid threats and critical infrastructure.

— Reduce the investment gap in the electricity grid. It recognises the need for unprecedented investment in electricity grids, in the areas of transmission and distribution, in order to achieve the highly interconnected, integrated and synchronised European electricity system that is needed to achieve the EU's decarbonisation, competitiveness and security of supply objectives.

— Towards faster network deployment and nature sensitive design. Emphasises the need to accelerate the standardisation of electricity infrastructure in order to minimise disruptions to itsminister's chains and to ensure that network components are available in Europe.

1.2. Main regulatory changes since the drafting of the NECP in force

The period following the preparation of the 2021-2 030 NECP has been marked by profound transformations in the energy system, firstly by the COVID-19 pandemic and its effects on *the* energy mix and economicactivity, and in the last two years by the energy crisis, which began in summer 2021 with the reduction of Russian gas supplies and intensified in February 2022 with Russia's invasion of Ukraine. This period has been marked by intense regulatory activity focused on urgently cushioning price increases for all consumers,-protecting the most vulnerable and ensuring security of supply as part of the **National Response Plan to the economic and social consequences of the war in Ukraine**23.

Most of these actions have been part of the **Plan More Energy Security (+ SE)**. These include the adoption in June 2022 of the **Iberian mechanism** to decouple the price of natural gas from the trico market, which has reduced the price of electricity in Spain and Portugal compared to other European countries and generated savings of more than EUR 5.000 billion.

This tool has been accompanied by a set of tax and regulatory measures set out in Royal Decree-Law 6/2022 of 29 March and Royal Decree-Law 11/2022 of 25 June, as well as in the following rules that have apportionedmany of the tools cited. These regulatory tools aim to reduce the impactof energy bills on businesses and household consumers, with a particular focus on vulnerable consumers. These tools include the reduction of VAT on electricity and natural gas to 5 % and the special electricity tax to 0.5 %, the decrease in charges by 55 % compared to 1 June 2021 and of 80 % for tolls for the electro-intensive industry, the ban on cutting off the supply of light, gas and water to vulnerable consumers, the butane bottle cap, the fuel price bonus and the flexibility of natural gas contracts to industry. In addition, Royal Decree-Law 18/2022 of 18 October 2015*limited* the last appeal tariff for natural gas for families and SMEs and created a new Final Appeal Tariff for the Community.

During this stage, the scope of the measures to protect vulnerable consumers has also been widened by thecreation, with Royal Decree-Law 17/2021 of 14 September 2013, of a minimum supply of essential services guaranteeing minimum comfort conditions for the beneficiaries of the social voucher, and by strengthening this benefit by means of Royal Decree-Law 6/2022 of 29 March 2020, by extending the income thresholds for qualifying as a vulnerable consumer, reducing the maximum period for deciding on applications, automatically renewing the voucher and strengthening the guarantees. Furthermore, Royal Decree-Law 18/2022 of 18 October*extended* the discount of the electricitybonus for vulnerable and severe vulnerable consumers to 65 % and 80 % respectively, and doubled the aid for the social thermal voucher.

In addition, structural measures have been implemented to accelerate renewable deployment and strengthensecurity of supply. Following the approval of the new economic renewable energy scheme for electricity generatinginstallations and the establishment of

23National plan to respond to the economic and social consequences of the war in Ukraine

an indicative timetable for the period 2020-2025, four auctions have been held and awarded 6.380 MW.

Measures to facilitate the deployment of renewables and self-consumption have also been approved, in line with those adopted atthe European level through REPowerEU. Specifically, Royal Decree-Law 23/2020 of 23 June 2021*simplified* and streamlined the processing of renewable projects and the associated electricity infrastructure, removing barriers to their start-up.

The processing of self-consumption facilities was also speeded up. By Order TED/1247/2021 on variabledistribution co-efficiencies, the allocation of energy generated in collective self-consumption was optimised by allowing the voluntary transition from fixed distribution coefficients to variable distribution coefficients. In addition, Royal Decree-Law 29/2021 of 21 December allowed the connection of installations via the grid at any voltage level and exempted self-consumption installations with excess power of no more than 100 kW from submitting the required guarantees in the access and connection procedure.

In addition, Royal Decree-Law 6/2022 of 29 March 2013 released 10 % of the capacity of the transport network reserved for access competitions and amended the legislation so that, in the planned capacity tenders, all or part of the capacity to be convened may be used exclusively for self-consumption generation facilities.

These measures have been supplemented by the extension to 2 km of the maximum distance between generation facilities and consumption points, and the minimum period of residence in each mode of self-consumption(without or with surpluses) has been reduced from 1 year to 4 months. The Royal Decree, which will regulate the two legal forms falling within the scope of energy communities, has also been initiated: renewable energy communities and citizen energy communities.

Furthermore, in order to promote the emergence of innovative solutions in the field of renewable energies and to facilitate the development of new business models in key areas such as electricity infrastructure, smart grids or storage, Royal Decree 568/2022 of 11 July 2015 approved the general framework of theregulatory prue bank (*sandboxes*) for the promotion of research and innovation in the electricity sector, the development of which is included as one of the measures of this Plan.

In addition, Royal Decree-Law 8/2023 approved a reform of the consolidated text of the Water Law to facilitate, in line with Article 7 of the CCTE Law, the development of hydraulic energy storageby reversible hydro plants. Reference can also be made to Royal Decree 150/2023, of 28 February, approving the maritime spatial plans for the five Spanish marine districts (MEOP).

During 2023, the CAE System, Energy Saving Certificates, was approved by Royal Decree 36/2023 of 24January. This system of white certificates will accelerate the pace of energy efficiency investments in all sectors of final energy consumption, such as transport, industry, tertiary (including buildings) residential and primary sectors.

Legislative and non-legislative policies and measures to transpose and implement the provisions of Directive (EU) 2018/2001 as amended and other files making up the Fit for 55 package

In Spain, the legislative or regulatory initiatives that the various ministerial departments intend to submit each calendar year to the Council of Ministers for approval are set out in the Annual Regulatory Plan of the General State Administration, the annual regulatory plan for this year having been published in April 2024[24].

The aforementioned Annual Regulatory Plan of the General State Administration for 2 024 was approved by the Government in accordance with Article 25 of Government Law 50/1997 of 27 November. It sets out the legislative or regulatory initiatives that the various ministerial departments intend to submitto the Council of Ministers for approval during that year, in accordance with Article 2 of Royal Decree 286/2017 of 24 March 2007 regulating the Annual Legislative Plan and the Annual Report on the Regulatory Evaluation

24Annual Regulatory Plan 2024

of the General State Administration and establishing the Regulatory Planning and Evaluation Board. As in previous years, the Plan has been coordinated by the Ministry of the Presidency, Justice and Relations with the Parliament and drawn up on the basis of the initiatives of the various ministerial departments, by the Regulatory Planning and Evaluation Board, for subsequent submission to the Co General-Mission of State Secretaries and Undersecretaries and to the Council of Ministers for approval.

The Annual Legislative Plan is not only an instrument for planning the Government's regulatory activity, but also for transparency, in so far as it ensures that citizens are sufficiently aware of this activity, ensuring a predictable environment for proper consideration of all the interests affected by the proposed rules; as well as for monitoring the degree of compliance with the commitments identified by the Government programme and translated into the regulatory initiatives taken in the Plan.

With regard to the transposition of Directive (EU) 2018/2001 on the promotion of the use of renewable energy as amended (RED III) and other files making up the Fit for 55 package, the various legislative and non-legislative initiatives and their corresponding planned approval dates are set out in the respective policies and measures forming part of the NECP.

1.3. Current energy and climate policies and measures relating to the five dimensions of the Energy Union

The first NECP contains a compilation of the main energy and climate policies and measures in place prior to their adoption. Since then, the NECP has been set up as a structuring framework for this type oflitic pool and measures, which have been developed in coherence with the Plan.

1. Decarbonisation of the economy

In line with the international context and European energy and climate policies, in recent years Spain has made profound changes to bring the regulatory and policy framework in line with national commitmentsin this area. In this regard, the ratification of the Paris Agreement in 2017 or the actions to implement the 2030 Agenda for Sustainable Development in Spain should be highlighted.

In line with this, the Spanish Government has developed the Strategic Energy and Climate Framework, which contains various strategic and legislative elements that aim to set out the main lines of action on the path to climate neutrality. One of the key elements of this framework is Law 7/2021 of 20 May on climate changeand energy transition, which establishes the regulatory framework to ensure Spain's compliance with the objectives of the Paris Agreement, facilitate the decarbonisation of the economy and promote a sustainable development model.

Law 7/2021 of 20 May 2007 on climate change and energy transition responds to Spain's commitment at international and European level and presents an opportunity from the economic and modernisation point of view of our country, as well as from the social point of view, facilitating the fair distribution of wealth in the decarbonisation process. In this way, the law puts the fight against climate change and the energy transition at the heart of political action, as a key driver of the economy and society to build the future and generate newsocio-economic assets. It is the institutional framework to facilitate in a predictable manner the progressive alignment of the country's reality with the requirements governing climate action and to ensure the coordination of sectoral policies, ensuring coherence between them and synergies to achieve the objective of climate neutrality.

Law on Climate Change and Energy Transition

Law 7/2021 of 20 May 2007 on climate change and energy transition places the fight against climate change and energy transition at the heart of political action for the first time, as key vectors of the economy and society. This law is the result of a science-based drafting process, which is very busy, heavily involved and burdened with the demands of all Spanish society that prepares us to

respond forambitious purposes to the challenges we face as a result of climate change. This project was created as an opportunity to frame institutionally and steer the recovery process towards a model of stable, lasting prosperity that respects planetary boundaries.

The law outlines how to prevent the impacts of climate change, how to reduce its causes, how to protect and value our natural heritage, how to modernise our industry and make it competitive in new markets, how to facilitate a fair distribution of wealth in the decarbonisation process with social fairness and a just transition, how to attract investments in the technologies of the future, or how to avoid financial risks to the country and our companies and financial institutions, among many other aspects.

The law therefore facilitates the stability and predictability needed to avoid additional costs or the generation of captive assets, which could hamper the progress of our economy for decades, minimising thenegative negative impacts on both social and ecosystems. It also facilitates the exploitation of economic opportunities, while offering accompanying measures in the transition of more vulnerable territories and groups.

Its measures aim to achieve greater resource efficiency, energy diversification and integration of renewable energy into our electricity grid by prioritising new water concessions granted to this purpose, notably through the promotion of reversible hydro plants, clean mobility, healthy air, more liveable cities, organic farming and diet, boosting rural Spain and promoting nature and biodiversity conservation, our coastline and water, strengthening public health, education and people's participation in decision-making processes.

To this end, it sets ambitious objectives, placing our country at the forefront of the new model of nestedcoal development, which may also be revised, but always upwards. These objectives are the clear and strong signal that the State must give in order to create a framework of confidence in the direction the country must take, in investments, in our model of production and consumption. They are objectives consistent with the EU framework.

As also a key part of the Strategic Energy and Climate Framework, the Law on Climate Change and Gender Transitionidentifies as the planning tools to address the energy transition to the NECP and theLong-Term Carbon Strategy (LTS). While the NECP sets the decarbonisation path in this first decade, the Long-Term Decarbonisation Strategy extends this path to climate neutrality in 2050, a scenario where greenhouse gas emissions will be compensated by sinks.

The Long-term Decarbonisation Strategy

The transition made by the ELP will enable Spain to reduce its greenhouse gas (GHG) emissions by 90 % below 1990 levels by 2050, which means reaching climate neutrality. The remaining 10 % will be absorbed by sinks.

The LTS provides, on the basis of available scientific and technical knowledge, and with a technology-neutral approach, medium- and long-term signals to investors, economic, social and environmental actors, as well as to Spanish society as a whole, to anticipate and plan the transition to a climate-neutral economy, identifying potential positive effects on economic development, employment and human health and the environment. It is therefore a strategic analysis ofmy economy's decarbonisation options through investment in clean and cost-effective technological solutions, generating jobs, boosting Spain's leadership in renewable energy, empowering citizens and ensuring social justice and a just transition.

Its structure integrates the opportunities of climate neutrality, different mitigation options through renewables and energy savings and efficiency, as well as at sectoral level. It also addresses the role of carbon sinks to offset emissions that cannot be avoided, while contributing to safeguarding biodiversity.

The path developed by the ELP will make it possible to change the energy paradigm, placing the energy systemat the heart of renewable energies by the middle of the century, which will transform and increase the competitiveness of the Spanish economy, while improving the health and quality of life of citizens.

In addition, the path to climate neutrality is affected by multiple factors that are cross-cutting to thelogical echo-transition and are also addressed by the LTS. Citizens will turn their traditional role at the centre of this change, with a particular focus on vulnerable groups and sectors, as well as those in Just Transition areas, generating sustainable employment opportunities, especially in rural areas, also addressingthe demographic challenge. This Strategy also integrates a gender perspective with a gender equality approach. In addition, it has multiple synergies with the UN Sustainable Development Goals. Another major dimension addressed in the LFS, in addition to mitigation, is adaptation, in response to the need to address the challenge of managing risks and reducing vulnerability to currentand future climate cam in Spain.

The transition towards climate neutrality presents multiple opportunities for our industry,mediating the development of strategic sectors such as renewables, green hydrogen and energy storage throughout its value chain. The deployment of these technologies will also contribute to energy self-supply and more efficient use of resources, leading to environmental care and greater resilience to climate change. New transformations will be carried out on the basis of increased territorial cohesion, contributing to rural development and addressing the demographic challenge, but also by designing more liveable cities, while opening up new opportunities for employment.

Completing the Strategic Energy and Climate Framework, the Just Transition Strategy, adopted in 2019, has as its main objective to maximise employment opportunities and minimise the impacts of the energy transition.

The existing policies and measures at national level, adopted or implemented so far in the field of decarbonisationor with an impact on GHG reduction, are spread across different sectors and departments. The detailed list can be found in Annex C. Furthermore, there are Autonomous Communities and local authorities which, in their areas of competence, have put in place ambitious energy and climate plans and measures.

Highlights the implementation in the diffuse sectors of projects promoted through the **Carbon Fund for a Sustainable Economy** (FES-CO2) and designed to set a path for transforming the Spanish production system towards a decarbonised model, as well as **the Environmental Promotion Plans**, known as PIMA, measures to combat climate change at national level. It is also noteworthy to create a tax on flue-gases, which has enabled this sector to transform rapidly by drastically reducing its emissions.

As regards the sectors subject to emissions trading, the European scheme is governed by Law 1/2005 of 9 March 2007, currently under revision, and by various royal decrees implementing it. This scheme affects around **900 industrial and electricity generation installations in** Spain. In addition, our country is entrusted with the management of almost 100 aircraft operators, of which 30 are active, and about half of them are foreign nationals; and, since 2024, also from 450 shipping companies, with more than 3.100 vessels.

For its part, the electricity sector is one of the cornerstones of this process of decarbonisation of the economy. Renewables will be undisputable players in their transformation. In this regard, the IPCC notes that the costs and deployment of renewable technologies for decarbonisation are rapidly changing. By way of example, between 2010 and 2019, there have been substantial reductions in unit costs for solar energy (85 %), wind energy (55 %) and lithium-ion batteries (85 %), as well as strong increases in their deployment, although they vary across regions.

In line with this, the regulation of the sector is being adapted, in line with European regulation and in order to contribute to the overall objectives of reducing emissions and increasing the presence of renewable energies. In this regard, the adoption of Royal Decree-Law 23/2020 of 23 June approving measures in theenergy sector and in other areas for economic recovery is a milestone in the transformation of this sector, introducing a series of measures aimed at ensuring an energy transition that is clean, fair, reliable and-economically competitive.

This legislation incorporated into our legal system the same important features as energy storage, renewable energy communities, demand management, aggregators or hybridisation, as well as measures to boost high-capacity charging infrastructure, or measures to improve and simplify, inter alia, authorisation procedures for the construction, extension, modification and operation of electricity

production, transmission and distribution installations. In addition, in order to boost R & D & I in the sector, it introduced simplified authorisation procedures for R & D & I projects, or regulatory test-beds, whichwere subsequently removed by Royal Decree 568/2022 of 11 July.

In addition, and on the basis of Royal Decree-Law 23/2020, Royal Decree 960/2020, of 3 November, regulating the economic system for renewable energy for installations producing electricity, provides for the launch of auction calls for the award of the economic scheme through competitive tendering procedures. Following the approval of the new economic renewable energy regime for electricity generation installations and the establishment of an indicative timetable for the period 2020-2025, four auctions have been held and allotted 6.380 MW.

Another key element in ordering the deployment of renewable energies needed in this energy transition process is Royal Decree 1183/2020 of 29 December 2003 on access to and connection to theelectricity transmission and district networks, the purpose of which is to establish the principles and criteria for applying for, processing and issuingpermits for access and connection to electricity transmission and distribution networks.

On the other hand, **the implementation of self-consumption measures has led to an exemplary growthin this technology since 2019.** In this regard, the adoption of Royal Decree 244/2019 of 5 April 2007 regulating the administrative, technical and economic conditions for self-consumption of electricity, the launch of the Self-Consumption Roadmap and, in particular, the aid launched at sea under Royal Decree 477/2021of 29 June 2003 on incentive schemes linked to self-consumption and storage, with renewable energy sources, and the introduction of renewable thermal systems in the residential sector, as part of the Recovery, Transformation and Resilience Plan, have been key to this impetus.

It is also noteworthy that progress has been made in promoting energy storage, through regulations such asRoyal Decree 1183/2020, which provides for the possibility of hybridising this type of plant, or Royal Decree-Law 6/2022, which facilitates the processing of these installations, or through Royal Decree-Law 8/2023, which recogniseshydro storage as an element that contributes to decarbonisation by helping to provide safety in the electricity system by integrating other non-manageable renewable energies and reducing discharges.

In relation to the promotion of the use of biofuels, the most recent impetus was given at the end of 2015 (Royal Decree 1085/2015 of 4 December on the promotion of biofuels) through new minimum annual targetsand mandatory sales or consumption. These can be achieved flexibly by obligated parties through biocar-burant certificates in diesel or petrol without distinction. Recently, by the end of 2022, **Royal Decree 376/2022** has extended the minimum mandatory targets for the sale or consumption of biofuels for transport purposes for the period until 2026 (to reach 12 % in 2026). The Royal Decree also sets targets for the energy content of advanced biofuels and biogas until 2030: 0.1 % as an indication in the years 2020 and 2021 and, on a compulsory basis, of at least 0.2 % in 2022, 1 % in 2025 and 3.5 % in 2030.

In addition, **Order TED/1342/2022 established** a limitation on biofuels produced from food and feed crops, which will be reduced to 2.6 % in 2025.

Recently, Order TED/728/2024 of 15 July was approved, developing the machinery forbiofuels and other renewable fuels for transport purposes, which includes the aviation and shipping sectors, as well as biogas, hydrogen and other renewable fuels of non-biological origin, in the calculation towards the 2030 targets; the possibility of meeting the targets for renewables in transport through the consumption of biofuels from high land-use change-risk feedstocks in 2025 has been removed.

Moreover, Royal Decree 663/2024 of 9 July allocated EUR 794 million in direct aid to the seven Spanish renewable hydrogen production and intensive projects in large-scale elegi industrial activitiestwo by the European Commission under the Important Project of Common European Interest Hy2Use.

This is the second of those approved by Brussels as part of the strategic commitment to boost the EU's industrial value chain for green hydrogen, from R & D to the production and use of this energy carrier in the most difficult sectors of economic and productive activity to decarbonise.

Five of the beneficiary initiatives include the construction of high-capacity electrolysers – of 100 MW or more – in high-industrial environments such as ports and other industrial complexes, forming integrated clusters or valleys and falling under the Technology Field 1 line. The other two proposals provide for the launch of renewable hydrogen generation projects to be used in the manufacture of fertilisers and other chemical compoundsand fall under the Technology Field 2 line, which aims to facilitate the technological replacement of fossil fuels in industrial sectors.

The seven IPCEI Hy2Use projects add up to 652,2 new MW of electrolysis power on an aggregate basis and, ineconomic know-how, will mobilise resources worth EUR 1.141 million immediately and over 6.000 million in totalversion over their lifetime.

Finally, it should be noted that recent initiatives to decarbonise the economy resulted in **two agreements** for the coal sector with trade unions and companies: one for the closure of mining operations on 24 October 2018, the *Framework Agreement for a Just Transition of Coal Mining and the Sustainable Development of Mining District for the Period 2019-2027*, and the other related to the closure of coal-fired thermal power plants, the *JustEnergy Transit Agreement for closed thermal power plants,* to which the plants of 3 companies were incorporated in 2020 and those of an additional company in 2021, thus incorporating all coal-fired power plants in Spain. In addition, Just Transition Conventions have been developed in the affected areas to support new business and industrial initiatives, local social and environmental infrastructure, support to workers and environmental mine restoration works. In this way, projects driven by aid granted or agreements reached in May 2023 will create a similar volume of employment as in the installations under closure, as implemented, although this distribution is not the same among all the areas concerned.

2. Energy efficiency

Measures to promote energy efficiency include a range of legislative or economic support measures aimed at producing a general or specific impact on each consumption sector. The most important structural decision in the previous period, 2014-2020, was the establishment **of the National System of Energy Efficiency Obligations (SNOEE)**, together with the creation of the **National Energy Efficiency Fund** (NEEF), to financenational energy efficiency centres (as provided for in Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency).

Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery **extends the period of validity of the SNOEE until 31 December 2030,** forcefully in accordancewith Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency.

The FNEE, led by its Monitoring and Control Committee, an interdepartmental body in which the main ministries with competence in the field are represented, is managed by IDAE. Its purpose is to finance mechanisms for economic, financial support, technical assistance, training, information or other measures aimed at increasing energy efficiency in the various energy-consuming sectors, so that they contribute to achieving the national energy savings target established by the national obligation scheme provided for in the EfiScience Energy Directive. This Fund articulates efficiency measures through calls for support programmes.

More recently, also under the SNOEE, and for this new obligation period 2021-2030, Royal Decree36/2023 of 24 January establishing an **Energy Saving Certificate System**, the PPA system, has been approved, which will contribute to achieving the ambitious cumulative final energy savings target for this period.

The promotion of energy efficiency in cities has had two main components or lines of action: buildings, on the one hand, and mobility of both passengers and freight, on the other. The promotion of a more sustainable andenergy-efficient trans transport system is the main driver of the Secure, Soste- nible and Connected Mobility Strategy 2030 of the Ministry of Transport and Sustainable Mobility (MITRAMS). Actions to improve the energy efficiency of buildings have been included in the **long-term strategy for energy renovation in the building sector in Spain (ERESEE)**, which has different pieces of legislation. This is the case with the Technical Building

Code25 (CTE), the Regulation on Thermal Installations in Buildings26 (RITE) or the Energy Certification System for Buildings,27 among others. These instruments have been updated, inter alia, to include the new requirements resulting from the updates of the Energy Efficiency Directive (2012/27/EU) and the EnergyEfficiency in Buildings Direc (2010/31/EU) carried out by Directive (EU) 2018/844. The latest revision of Directive 2010/31/EU, adopted in 2024, replaced the Long-Term Renovation Strategy, which the Member States were required to review and submit to the European Commission every 3 years, with a National Building Renovation Plan. Member States should submit the first draft National Building Renovation Plan to the Commission by 31 December 2025, and should review it every 5 years.

Within the building sector, rehabilitation support in Spain is mainly based on the PRTR support programmes, which are complemented by the NEEF and ERDF funds. Component 2 of the Plan, led by the Ministry of Housing and Urban Agenda (MIVAU), includes all programmes financed by NextGenerationEU funds under the Housing Rehabilitation and Urban Regeneration Plan.

This component of the PRTR includes the Support Programme for the Comprehensive Rehabilitation of Residential and Housing Buildings, which aims to boost the renovation of residential buildings, dwellings and neighbourhoods.

In addition, Component 2 of the PRTR includes the support programme for energy renovation actions in existing buildings (PREE) and the energy renovation programme for existing buildings in municipalities facing demographic challenges (PREE 5000 programme), led by the Ministry for the Ecological Transition and the Demographic Challenge through IDAE. These programmes give continuity to the programmes, PAREER-CRECE and PAREER II.

The basis for public support shall be the energy performance certificate of the building, which must contain a description of the building's energy characteristics as a starting point for an energy diagnosis. This certificate shall contain information on all energy-related elements (in thermal volvent,thermal heating, air-conditioning and domestic hot water production, lighting and control and management systems), as well as information on normal operating and occupancy conditions, thermal comfort conditions and indoor air quality, among others.

Actions to improve energy efficiency in transport and sustainable mobility in cities have been aimed at encouraging a modal shift in the mobility of people and goods towards the least energy-consuming modes per passenger-km or tonne-km, with the use of information and communication technologies (ICT) being one of the pillars for promoting new mobility services. In addition, they have included-actions aimed at improving the efficiency of the vehicle fleet through fleet renewal, the phasing-in of electric vehicles and other technological developments, as well as actions aimed at the efficient use of means of transport. Highlights in this regard the Law on Climate Change and Energy Transition, which stipulates in Article 14.3 the development of sustainable urban mobility plans for municipalities with more than 50.000 inhabitants, insoular territories and municipalities with more than 20.000 inhabitants exceeding the limit values for regulated pollutants. The mitigation measures provided for therein include the establishment of low-emission zones, the promotion of measures to facilitate walking, cycling or other active means of transport, as well as measures for the improvement and use of the public transport network, including multimodal integration measures. In this context, Royal Decree 1052/2022 of 27 December regulating low-emission zones aims to regulate the minimum requirements that local authorities must meet in accordance with Article 14 (3) of Law 7/2021 of 20 May on climate change and energy transition.

Energy efficiency measures targeting non-urban environments, i.e. sectors other than buildings or transport, also benefit from support measures tailored to the specific features of each sector. In industry, therehas been a policy of financial support for industrial investment as part of the public policy to promote social competitiveness; support programmes have been promoted for SMEs and large companies which, financed from the EEEF budget, have been primarily aimed at facilitating the implementation of energy saving and efficiency measures, while encouraging and promoting actions in the industrial sector that reduce carbondioxide emissions. Programmes have

25 Royal Decree 314/2006 of 17 March 2015 approving the Technical Building Code, the most recent amendments to which in the field of energyscience include those operated by Royal Decree 732/2019 of 20 December 2003 and Royal Decree 450/2022 of 14 June 2003.

26 Royal Decree 1027/2007 of 20 July, updated by Royal Decree 238/2013 of 5 April amending certain articles and technical instructions of RITE, and by Royal Decree 56/2016 of 12 February transposing Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, as regards energy audits, accreditation of serviceproviders and energy auditors and promotion of the efficiency of energy supply.

27 Royal Decree 390/2021 of 1 June 2015 approving the basic procedure for the certification of the energy performance of buildings.

also been carried out for agricultural installations under the FNEE and the PRTR. In addition, the Energy Saving Certificate System (CAE) was launched in January 2023, which is expected to have a significant impact on improving energy intensity in the final energy consuming sectors.

3. Energy security

In the energy crisis following Russia's invasion of Ukraine, Spain has demonstrated a relevant level of security of supply.

In the area of electricity, the high (and growing) renewable generation is increasingly dependent on external energy, while the Spanish electricity system shows higher levels of security of supply than neighbouring countries. In terms of international flows, Spain has electricity interconnections with France, Portugal and Morocco. In the energy context of last 2022, interconnection capacity contributed to France's guarantee of supply, in a context of high unavailability of its nuclear power park, with more than half of the installed capacity unavailable for several months. However, there is a need to further strengthen interconnection capacity in line with the objectives agreed at European level, both to facilitate further renewable integration and to contribute to a strengthened security of supply.

In the area of natural gas, security of supply in Spain is high for a number of reasons, highlighting high input, transmission and storage capacity, as well as the flexibility provided by the import capacity of Liculated Natural Gas (LNG). Thus, in 2021, 46 % of imports were made via a pipeline, compared to 54 % on methane vessels (in the form of Liculated Natural Gas through regasification plants). Currently, the most relevant international pipelines are Maghreb (Maghreb – Europe) and Medgaz (Liechtenstein – Almeria) and interconnections with France and Portugal. Furthermore, the Spanish regulatory framework requires a certain diversification of sources of natural gas supply, which reduces vulnerability. The breakdown by country of origin of natural gas imports in 2023 was as follows:

Algeria (29 %)
United States (21 %)
Russia (18 %)
Nigeria (14 %)
Catar (4 %)
France (4 %)
Others (10 %)

As far as petroleum products are concerned, Spain has a good diversification in terms of the basket of crude oilimports. The main countries of origin of crude oil in 2023 were the following, where no country accounted for more than 20 % of imports:

- United States (14 %)
- Mexico (11 %)
- Brazil (11 %)
- Nigeria (10 %)
- Libya (7 %)
- Angola (7 %)

Moreover, Spanish refineries, unlike a large number of European refineries, have invested heavily, particularly in the period 2009-2012, to deal with situations such as those experienced in recent years. Spanish refineries are thus prepared for processing different types of raw and origins. Finally, Spain has an extensive network of pipelines owned by Exolum, which facilitates the full distribution of oilducts and, in particular, reserves along the national geography in such a way that the marketing and delivery of the product is fast and agile and its distribution is highly optimised from an operational and economic point of view.

However, in order to further strengthen energy security, Spain'senergy security needs to be significantly reduced from 73 % in 2019, which will be reduced to 50 % thanks to the measures provided for in this plan.

In the most recent context, in view of the increase in geopolitical and market tensions, the above-mentioned Plan + SE has been articulated in order to provide more security against energy prices for households and theSpanish economy as a whole and to help increase the European Union's security of supply. The Plan + SE sets the objectives **of accelerating the energy transition, increasing**

protection for vulnerable consumers, households and businesses; strengthening **strategic and energy autonomy**; and strengthening **solidarity** with other Member States. Given its impact and responseto the five dimensions foreseen in the NECP: decarbonisation, efficiency, energy security, internal market and competitiveness, the impact of this Plan is incorporated into this update.

Finally, Spain approved in April 2019 its National Cybersecurity Strategy, whose role is to develop the forecasts of the 2017 National Security Strategy. Subsequently, fulfilling the mandate issued by the National Security Council and developing the aforementioned Strategy, the National Cybersecurity Plan was approved in March 2022.

The Plan + SE has enhanced and strengthened public-private partnerships with the various energy operators, which has been coordinated by the Coordination and Cybersecurity Office (OCC) of the Ministry of the Interior. Furthermore, thedesignated critical operators in the field of energy and nuclear industry have submitted their respective Operator Safety Plans (OSP), checking that they are in line with the current situation of threats and challenges to critical infrastructure in the energy sector and in the nuclear industry, updating the information contained in those plans.

4. Internal energy market: interconnectivity, infrastructure and market

A properly designed market is an essential factor in enabling the incorporation of renewable energy into thetopic. Thus, Directive 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity and Regulation 2019/943 of the European Parliament and of the Council of 5 June2019 on the internal market respond to the creation of a market framework that rewards flexibility and innovation, with the fundamental objective of ensuring an electricity supply that is accessible to all. These rules govern current electricity markets, ensuring that they are truly integrated, consumer-centric, flexible, fair and transparent markets, ensuring affordable and transparent energy prices and costs for consumers, a high degree of security of supply and a transition to a sustainable low-carbon energy system. However, in response to the price crisis in 2022, the European Commission launched **the electricity market reform**, concluded in June 2024, which focuses on aspects that require urgent adjustments to increase market resilience and reduce the impact of gas prices on electricity bills, while supporting the energy transition. The ultimate goal is for consumers to be affordable, for investors to have certainty and to preserve Europe's competitiveness, preparing the market for current and future premises, renewable technologies, storageand demand side. This reform of the electricity market, already embodied in Regulation (EU) 2024/1747 and Directive (EU) 2024/1711, provides the right signals to accelerate investments in storage and demand-side management, with important elements such as the development of capacity markets and specific instruments aimed at fostering greater flexibility in the electricity system.

With regard to electricity transmission infrastructure, the **2021-2026 Electricity Transmission Network Development Plan includes-the** infrastructure necessary to ensure security of supply in the planning zoneas of 2026. The future network development plan is governed by the guiding principles set out in Orden TEC/212/2019: meeting energy and climate commitments, maximising renewable penetration of the electricity system and its evacuation in high resource areas, ensuring security of supply, reconciling with environmental and technical constraints, maximising the use of the existing grid, fulfilling the principlesof efficiency and economic sustainability of the electricity system and reducing losses.

The current planning integrates renewable energy into the grid in order to help meet renewable energy targets in the medium and long term, and is adapted to the demand needs arising from new industrial and transport activities such as railways or electrification of seaports. The estimated investment cost of all the actions included in the 2021-2026 Transmission Network Development Plan is EUR 6.964 million, of which EUR 1.260 million relates to actions to strengthen international interconnections and EUR 5.704 million to actions to strengthen the transmission network that make up the national electricity system, which are those subject to an investment ceiling under sectoral legislation, with an average annual investment volume of EUR 951 million.

This development plan has been amended by the Resolution of 22 April 2024 of the Secretariat of State for Enquirypublishing the Agreement of the Council of Ministers of 16 April 2024 amending specific aspects of the 2021-2026 electricity transmission network development plan, approved byagreement of 22 March 2022. Amendments are made to the Plan, including 23 actions to meet new high power demands, nine actions for storage and renewable generation (of which four are in just transition hubs), three actions to

cover operational needs, and 38 actions to meet needs arising from the implementation of the current planning itself.

According to the data provided by the System Operator**, the set of one-off changes represent an increase in the associated investment value compared to the 2026 planning approved in March 2022 of EUR 489 million.**

In addition, **the government has foreseen a EUR 931 billion item to cover the costs of the modifications to the transmission network planning under the addendum to the Recovery, Transformation and Resilience Plan (Investment 4 of Component 31, linked to REPowerEU funds), approved by the European Commission last October 2023.**

In addition, the procedure for drawing up proposals for the development of the trica energy transmissionnetwork was launched for 2030, with the publication of Order TED 1375/2023 of 21 December. The proposal phase was open during the first quarter of 2024, and these were under analysis by the System Operator until the last quarter of this year.

The key objectives of the new planning include: compliance with the commitments on gentleand climate, ensuring the supply of electricity to distribution networks and customers connected to the transmission system and to potential customers with firm and mature projects within the established planning horizon, maximising the renewable penetration of the electricity system, minimising the risk of discharges, and in a manner compatible with the security of the electricity system, as well as the evacuation of renewable energy in areas with high renewable resources, compatibility of transmission system development with environmental restrictions, removal of technical restrictions, maintaining the electricity system efficiency and sustainability, maximising the existing grid and minimising losses, as well as the development of energy storage decarbonisation, industrial value chain development and territorial cohesion, while respecting the demographic challenge and the just transition.

Moreover, the determination of the volume of investment in transmission and distribution networks was laid down in a different economic and energytext from the current one. The regulation laid down in Royal Decree 1047/2013, of 27 de diciem, and Royal Decree 1048/2013 of 27 December, was primarily determined by the need to contain the costs of the electricity system at a time when the priority was to ensure the economic and financial sustainability of the electricity system in a context of less dynamic energy transition, where no transformation needs were foreseen to incorporate new large generation or consumption demands.

More than a decade later, the energy sector in general, and electricity in particular, are undergoing a structural transformation, driving an energy transition whose main manifestations are the deployment of renewables, the electrification of the economy, the development of new fuels and the emergence of new business models associated with the deployment of distributed resources.

In this context, it may be necessary to revise the regulation establishing annual and multiannual investment in transmission and distribution networks, in order to adapt it to the new context of energy transition and make it more flexible.

For**this reason, the Ministry for the Ecological Transition and the Demographic Challenge has conducted a prior public consultation, open until 3 July 2024, to address an amendment to the limits on investment in electricity grids, with the aim of promoting** the efficient development of the transmission and distribution network, maximising the use of theexisting truck infrastructure, preserving signals of electrification and economic competitiveness, and minimising the costs of tolls for consumers. Various options will be addressed, such as:

- The appropriateness in this context of accelerating the energy transition of increasing investment in distribution or transmission networks while preserving signals of electrification, economic competitiveness and the containment of tolls.
- The overall increase in the maximum volume of investment as a percentage of gross domestic producthas a value that is considered sufficient to meet the expected network needs
- Changing the assumptions under which the volume of investment could be changed upwards, including new circumstances associated with the energy transition.

- The establishment of a new procedure for the timely authorisation of investments in excess of the current maximum volume, at the request of carriers and distributors if they have previously exceeded the investment limit laid down in the legislation.

The National Commission on Markets and Competition (CNMC) has also developed a hugeregulatory framework for participation in the market and for electricity transmission and distribution networks.

Thus, by means *of the Decision of 6 March 2024 of the National Commission on Markets and Competition laying down detailed rules for the operationof electricity for the participation of demand and storage in non-cash servicesand in the solution of technical restrictions and the integration of technology hybridisation into the programming process,* the operating procedures of the System Operator 3.1, 3.8, 3.2, 14.4, 3.11, 9.2, 14.1 and 14.8 are amended to facilitate the participation of storage, demand and hybridisation in technical restrictions and non-frequency services.

The aim is to improve the efficiency, flexibility and responsiveness of the network to changes and demand, seeking a more efficient solution to technical constraints.

It also simplifies the regulatory process for hybrid energy installations, which can use renewableenergy sources and include storage, allowing these facilities to use existing connection points, potentially reducing costs and complexity. This is in line with current trends in energy management, which aims to increase the reliability of renewable energy sources and facilitate grid integration.

In turn, the implementation of the changes in December 2024 is envisaged, allowing for adequate preparation and adaptation by all stakeholders/stakeholders.

In addition, other proposed circulars are currently under way andare estimated to end between the second and third quarters of 2024:

- A proposal for a Circular setting out the methodology and conditions for access and connection to transmission and distribution networks of electricity demand facilities.

- The amendment to CNMC Circular 3/2020 of 15 January establishing the methodology for the charging ofelectricity transmission and distribution charges, which will regulate additional mechanisms for cost/revenuenation allocation

- The specific public consultation for the revision of the methodology for calculating the remuneration of electricitydistrict activity for the regulatory period 2026-2031

- In line with the previous one, the same public consultation process is planned to be launched this year for the Proposal for a Circular amending Circular 5/2019 of 5 December of the National Commission on Markets and Competition, establishing the methodology for calculating the remuneration for electricity transmission activity, for the regulatory period 2026-2031. In relation to transfrontier electricity interconnections, the degree of electricity interconnection between Spain and France is less than 3 % of the installed electricity production capacity in Spain, and falls well short of the objectives of the Energy Union: **10 % of installed electricity production capacity for all Member States by 2020 and 15 % by 2030**, therefore further development of new interconnections will be necessary.

In this direction and in the framework of cooperation initiated with the Madrid Summit in 2015, it is planned to increase interconnection capacity with France on the basis of the following extensions:

- Interconnection between Aquitaine (FR) and the Basque Country (ES), via a submarine cable along the Bay of Biscay, whichwill per se mitigate the fact that interconnection capacity between Spain and France reaches 5.000 MW by 2030

- Interconnection between Aragon (ES) and Pyrénées-Atlánticos (FR) and interconnection between Navarra (ES) and Landas (FR), which will increase interconnection capacity between Spain and France to 8.000 MW in 2035

Future planning of natural gas transmission infrastructure will take place once the updated regulation of the hydrocarbons sector has

been approved, taking into account new developments arising from the update of Community legislation, in particular from the recent revision of the Regulation and the Hydrogen and Natural Gas Directive. Until today, the basic regulation is laid down in Law 34/1998 of 7 October on the Hydrocarbons Sector, as well as in the provisions of Articles 79 and 80 of Law 2/2011 of 4 March on the sustainable economy. The Reference Documentis the Planning of the Electricity and Gas Sectors 2008-2016, approved on 30 May 2008 by Agreement of the Council of Ministers. The current planning analyses and identifies the need for new processing capacity, storage and regasification infrastructure, drawing the main axes in such a way as to create a safe and flexible system, in which all gas areas are connected with each other.

With regard to the organisation of the gas market, Directive 2009/73/EC concerning common rules for the internal market in natural gas provides that, for the proper functioning of the internal markets in electricity and noun gas, **energy regulators should be able to take decisions on all relevant regulatory issuesand be independent from any other public or private interest**. The European framework states that the tasks of the regulator include monitoring openness and competition in the wholesale and retail markets, as well as removing barriers to the development of self-consumption or access by consumers to their own data.

5. Research, innovation and competitiveness

MICIU (Ministry of Science, Innovation and Universities) is the department of the General State Administration responsible for proposing and implementing policy on scientific research, technological development andinnovation in all sectors. It is therefore responsible for developing R & I & c policy in the energy and climate sector, in coordination with the other ministerial departments with RDI actions in these areas and other actors involved.

The framework for action in the field of research, development and innovation is defined in twosuch documents: **the Spanish Strategy for Science, Technology and Innovation 2021-2027 (EECTI) and the State Plans forScientific, Technical and Innovation inventions (PEICTI),** which are the instrument for the development and achievement of the objectives of EECTI at national level, developed over two periods, the PEICTI 2021-2023 and the PEICTI 2024-2027, currently in force.

EECTI 2021-2027 is the basic instrument for consolidating and strengthening the Science, Technology and Innovation System (SECTI) in Spain in that period. It is specifically designed to facilitate the articulation of national R & D & I policies with European Union policies, aligning its objectives withthose of the EU, and in particular with the framework programme for funding R & D & I activities, '**Horizon Europe**' for the period 2021-2027, helping to encourage the active participation of **SECTI** actors in the European space. It also includes coordination between the actions of the General State Administration, the Autonomous Communities and theEuro Union, while proposing efficient coordination mechanisms between the actors of the SECTI.

R & D & I and industry must be at the heart of initiatives and clashes proposed by the public andnational sectors, and it is in this respect that EECTI has a strong emphasis on the need to bring science closer to theeconomic and social interest, in order to serve the **2030 Agenda and the EU's political priorities**. To achieve this objective, the Strategy prioritises and responds to the challenges of national strategic sectors in specific areas including, but not limited to, **climate, energy and mobility: climate change, decarbonisation, mobility and sustainability**.

The 2024-2027 PEICTI defines 19 specific objectives with a matrix view in which 12 objectives are addressed through **five vertical programmes** (targeting Human Resources, Research and Experimental Development, Transferen ciaand Collaboration, Innovation and Infrastructure) and 7 are addressed through **three cross-cutting programmes**, one of which is the **Transversal Strategic Lines Programme** aimed at supporting priority areas of intervention, including those aimed at the energy, green, digital and industrial transition. In addition, **framework conditions** are defined, which are present and have an impact on all programmes, both vertical and cross-cutting, and compliance withthese conditions needs to be verified in all actions. The framework conditions include eco-responsibility, aimed at contributing with the green transition, and promoting equality and diversity.

In addition, in the framework of the 2021-2027 Spanish Partnership Agreement with the European Union, which sets out the strategic lines and investment priorities of the Structural Funds for the period 2021-2027, EECTI 2021-2027, together with the PEICTI, is defined

as the **State Strategy for State Smart Specialisation S3** (*Smart SPE cialisationStrategy*), which sets out the elements necessary to comply with the favourable condition. In addition, EECTI covers **regional S3 Smart Specialisation Strategies** whose interaction is coordinated through the Scientific, Technological and Innovation Policy Council (CPCTI) and the Public R & D & I Policy Network (REDIDI). In this context, the **S3P-Energy Platform, set up by the European Commission, is a tool to support the implementation of the Smart Specialisation in Energy Strategies** of regions and countries that include thematic priorities related to energy, in particular as regards energy innovation activities at (sub) national, regional and local level. This platform also connects and gives visibility to the various national and regional priorities and strategies by facilitating cooperation and avoiding atomisation of efforts. The S3P-Energy incor currentlyhas six interregional partnerships on Bioenergy, Geothermal Energy, Marine Renewable Energy, Smart-Networks, Solar Energy and Sustainable Buildings.

With regard to cooperation at national level, highlights the role of the **Spanish Technology Platforms,** which are team-working forums, led by industry, which include all SECTI actors (companies, technical centres, public research bodies, universities, R & D & I centres, associations, foundations, etc.), with the central objective of defining the short-, medium- and long-term vision of the sector and establishing a strategic R & I route.

In the field of energy, the ALINNE **initiative**[28]**,** the development of which is one of the measures of this plan, should be highlighted. It is a not-for-profit energy initiative that is launched to bring together and coordinate efforts among all actors in the energy R & I value chain against the main energy challenges, contributing to the definition of working patterns at national and European level. ALINNE is supported by the Spanish Energy Technology Platforms and therefore presents a broad capability map including Energy Efficiency, Biomass, Wind Power, Concentration Solar, Low-Temperature Solar, Photovoltaic, Geothermal, Hydrogen and Cells, Intelligent Networks, Vision Energy, Energy Storage Systems, as well as CO_2 Storage and Capture.

In addition, EECTI and the PEICTI complement and align with sectoral policies. In this regard, in addition to integrating the R & D & I action lines of this Plan, coordination is established with theLong-Term Donisation Strategy (LTS) 2050, the Second National Climate Change Adaptation Plan (PNACC) and the Just Transition Strategy, as well as with the Energy Storage Strategy, the Hydrogen Roadmap: a commitment to renewable hydrogen, the Roadmap for the Development of Marine Wind and Marine Energy in Spain, the Biogas Roadmap, the Safe, Sustainable and Connected Mobility Strategy 2030, the Spanish Urban Agenda, the Self-Consumption Roadmap, the Spanish Circular Economy Strategy 2030 or the Long-term Strategy for Energy Renovation in the Building Sector in Spain, among others.

Furthermore, within the PRTR, leverage policy VI **"Pact for Science and Innovation". Strengthening the capacities of the national health system'** incorporates Component 17 **"Institutional reform and strengtheningSECTI, technology and innovation capaci"**. This component aims to undertake institutional reform and strengthen the capacities of SECTI to bring it into line with international standards and to improve its effectiveness, coordination, governance and knowledge transfer. The aim is to address, in the short term, the country's economic and social recovery and, in the medium term, to make SECTI a key instrument to address major challenges such as the green and just transition, digitalisation and the demographic challenge and to increase and accelerate investment in ± D & I in a sustainable manner and in strategic areas to reach the European average by 2027. One of the implementedreforms has been the **amendment of the Law on Science, Technology and Innovation, through Law 17/2022**, with three key axes: 1 Improve the governance and coordination of SECTI; 2 Achieving an attractive and stable scientific career, allowing scientific talent to be retained; 3 Strengthen the transfer of research results to society.

In addition to component 17, other levers and components of the PRTR include actions linked to R & I & c aligned with the green transition axis and particularly in the Palanca Policy III specifically aimed at activating and accelerating the just and inclusive energy transition and its components: **7 Deployment and integration of renewable energy**; **8 Electricalinfrastructure, promotion of smart grids and deployment of flexibility and storage**; **9 Roadmap for renewable hydrogen and its sectoral integration**; and **10. Just Transition Strategy**. In the addendum to the PRTR, in the new Component 31 (REPowerEU Chapter), investments linked also to R & I & c are included.

28Energy Research and Innovation Alliance (ALINNE)

As explained above, the PRTR also creates PERTE (Strategic Projectsfor Recovery and Economic Transformation) as public-private partnerships involving the various public administrations, businesses and research centres. Its aim is to promote major initiatives that clearly contribute to the transformation of the Spanish economy and aim to stay and go beyond the temporary framework of the PRTR. Twelve strategic projects have been approved for the time being, including the special energy and climate link between the **PERTE for renewable energy, reno hydrogenand storage (ERHA), the PERTE for the development of electric and connected vehicles (VEC), and the PERTE for industrial decarbonisation**. In addition to these, reference should be made to other PERTEs that incorporate R & D & I actions linked to energy and climate, such as agri-food, the circular economy, the Naval Industry, the RospaceAe Sector and the Digitisation of the Water Cycle.

In addition, the Plan More Energy Security (+ SE) includes a series of measures to support the value chain of the energy transition, including accelerating and expanding the financial envelope of PERTE ERHA and removingthe PERTE Industrial Decarbonisation to improve competitiveness and reduce energy costs in the manufacturing sector.

Spain is engaged, within the European framework, in an energy transformation that is cost-effective and makes it possible to meet the European targets for reducing GHG emissions and decarbonising the economy, as set out in the European Green Deal, the 'European Climate Law' and taking into account the strategy 'A New Industrial Strategy for Europe', which ensures the importance of R & D & I to improve and boost the competitiveness of European industry. Moreover, the **SET-Plan** has a key role to play, which puts research, innovation and deployment of low-carbon energy technologies as a key pillar to accelerate the energy transition, as enshrined in the fifth dimension of the Energy Union in research, innovation and competitiveness. The SET-Plan has undergone a review process to align its objectives with those of the European Green Deal and the European energy policy context, which includes the objectives of the *REPowerEU* Plan and those of the *Green Deal IndusTrial Plan*, in particular the *Net-Zero Industry Act* and the *Critical Raw Materials Act*. The Communication on the revised SET-Plan was adopted on 20 October 2023 and underlines the need to increase the resilience, autonomy and competitiveness of the European energy system and its supply chains.

In addition, Spain actively participates in various transnational **technology collaboration programmes**, including Horizon Europe, Eureka, Bilateral Cooperation Programmes, PRIMA, Innovative SMEs – Eurostars 3, European partnerships (in particular Co-Fund *CET-technologies* for clean energytransi and DUT-technologies and innovative solutions for urban transition) among others.

OBJECTIVES

GENERAL AND SPECIFIC

2. GENERAL AND SPECIFIC OBJECTIVES

The policies and measures included in this update of the NECP 2023-2030 represent an increase inambition respecting the previous version in all its dimensions, consistent with the European context and the new proposals stemming from the Fit for 55 and REPowerEU packages. The impact of the PRTR, the need to accelerate the energy transition or progress in implementing the measures set out in the previous paragraph are some of the levers that haveattributed these objectives and results upwards. Through its implementation, the objectives set out in the European framework will be fully met.

Table 2.1. Comparison of objectives and results between the NECP 2021-2030 and the updated document

		Results in 2030	
		NECP 2020	NECP 2023
Generals	GHG emissions reduction compared to 1990	23 %	32 %
	GHG emissions reduction compared to 2005 – ETS sectors	— 61 %	— 70 %
	GHG emissions reduction compared to 2005 – diffuse sectors	— 39.1 %	— 42 %
	Share of renewables in electricity generation	74 %	81 %
	Number of electric vehicles	5 million	5.5 million
	Number of dwellings rehabilitated	1.200.000	1.377.000
	Total and renewable power of the energy mix	Total: 160 GW REN: 113 GW	Total: 214 GW REN: 160 GW
	Renewable share of final energy	42 %	48 %
	Energy Efficiency. Reduction of primary energy consumption	— 39.5 %	— 39.5 %
	Energy efficiency Reduction of final energy consumption	— 41.7 %	— 43 %
	Energy dependence	61 %	50 %
	GHG emission reduction in transport	— —	16.3 %
Transport	Share of renewables in the transport sector	15 % *	28 %
	Combined share of RFNBO******** + Advanced Bios and Annex IX Part A biogas	2.1 %	17.26 %
Industry	Annual increase in the share of renewable energy in industry	1.1 %	2.14 % (2021-2025) 2.97 % (2026-2030)
	Share of RFNBO in hydrogen in industry	25 % * *	74 %
Building,	Final renewable energy in buildings	— —	67.59 %
cooling heating	Annual increase in the share of renewable heating and cooling	0.83 % (2021-2025) 1.19 % (2026-2030)	1.42 % (2021-2025) 2.36 % (2026-2030)

** In the amendment to the Renewable Energy Directive, a change in the methodology for calculating this term has been established, meaning that 28 % of this-problem in the previous NECP has changed to 15 %.*

** * renewable Hydrogen Route Sheet*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The update scenario is the result of implementing, in the energy system model described in Annex B, the policies and measures included in section 3 of this document. Following the optimisation carried out by the TIMES-Sinergia model, a scenario coincides with the cost-

RFNBO: Renewable fuels of non-biological origin: Renewable fuels of non-biological origin

efficient solution for the realisation of these measures and the existing contour conditions. In this way, the model works on a solution space where measures are intertwined witheach other, where, for example, the inclusion of self-consumption will be accompanied by electrification of end uses with the most efficient technologies, and therefore the various measures, which are addressed as a whole, are inextricably linked, interlinked and create positive synergies that simultaneously achieve several objectives.

The results of the NECP 2023-2030 enable the objectives set by the Fit for 55 package and the REPowerEU plan to be met at European level, as shown below:

Table 2.2. Comparison of Fit for 55 objectives and results between NECP 2023-2030

Objectives 2030	FIT for 55 (EU)	NECP 2023 (S)
GHG reduction compared to 1990	55 %	32 %
Renewable share of final energy consumption	42.5 % (+ indicative 2.5 %)	48 %
Energy efficiency	38 % *	39.5 % (PEC)/43 % (FEC)
Reduction of ETS emissions vs 2005	62 %	70 %
Share of renewable energy in final energy consumption. Transport sector	≥ 23.5 %††††††††	28 %
Reduction of greenhouse gas intensity. Transport sector	≥ 11.8 %‡‡‡‡‡‡‡‡	16.3 %
Combined share of advanced biofuels and biogas produced from feedstocks listed in Part A of Annex IX and RFNBOs in the energy supplied. Transport sector	5.5 %	17.26 %
Share of RFNBOs in the energy supplied. Transport sector	1 %	11.61 %
Food and feed crop-based biofuels, bioliquids and biomass fuels	· Quota 2020 + 1 %§§§§§§§§ (Maximum 7 %)	1.5 %
Biofuels from Annex IX.B feedstocks	· 1.7 %	1.1 %
Advanced biofuels and biogas from feedstock listed in Annex IX Part A.	≥ 2.2 %	6.9 %
Average annual increase in renewable energy. Heating and cooling sector	0.8 % (2021-2025) 1.1 % (2026-2030)	1.42 % (2021-2025) 2.36 % (2026-2030)
RFNBOs on the hydrogen used (final energy and non-energy uses). Industrial sector	42 %	74 %
Average annual increase in the share of renewable energy. Industrial sector	1.6 % (2021-2025) 1.6 % (2026-2030)	2.14 % (2021-2025) 2.97 % (2026-2030)
Renewable energies on final consumption. Building sector	49 % (Indicative objective)	67.59 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

** For projections at 2030 of the European Commission's PRIMES Model (2007)*

It is important to note that the approval of the draft update of the 2023 integrated National Energy and Climate Plan2030, and its corresponding objectives, coincided in time with the negotiation of most of the legislation making up the Fit for 55 package, and at that point in time, the objectives of the draft were aligned with objectives andmethods that were not fully defined. Following the adoption of the Fit for 55 package, some of the objectivespreviously set out in the draft have undergone changes, mainly due to methodological changes in the European legislation definitively adopted.

††††††††Share of renewable energy in final energy consumption in the transport sector, according to Article 25 (1) (a) (i) of RED III, corresponds to 29 %. Pursuant to Article 26 (1) (ii), the target for Spain is reduced to 23.5 %.

The‡‡‡‡‡‡‡‡ reduction of greenhouse gas intensity in the transport sector, according to Article 25 (1) (a) (ii) of the RED III, corresponds to 14.5 %. In accordance withArticle 26 (1) (ii), the target for Spain is reduced to 11.8 %.

§§§§§§§§Share in 2020 + 1 % corresponds to 4 %

The implementation of the NECP and compliance with the objectives set also entails the reporting requirement laid down in Regulation (EU) 2018/1999, which states that Member States must communicate to the Commission the state of play of the implementation of their integrated national energy and climate plan. In order to send this information, the Reportnet and ReporENER[2] systems are in place, the reports being subject to a quality control andassurance process. Both the guides for reporting and information provided by the Member States are available*********.

2.1. Decarbonisation dimension

As noted above, Spain's long-term objective is to become a **carbon neutral country by 2050** (net zero GHG emissions), which requires achieving a mitigation of at least 90 % of total gross GHG emissions compared to the base year 1990. As an intermediate milestone in this direction, and as a result of the measures featuredin this Plan, **the 309,6 $MtCO_{2\ eq\ emitted}$in 2019 will be increased from 195,2$_{MtCO_2}$eq in 2030**, which means that more than one third of the emissions will be withdrawn between the two dates. The sectors of the economy which, in absolute terms, will reduce their emissions most in this period are:

Table 2.3. Evolution of emissions (thousand tonnes of CO2 equivalent)

Emission projection in PNIEC Scenario 2023-2030 ($ktCO_2eq$)*							
Years	2005	2010	2015	2019	2020	2025	2030
Transport	102.842	91.917	83.730	91.408	73.868	82.478	59.577
Production of electricity	112.781	60.460	74.098	44.028	30.751	13.436	12.102
Industrial sector (combustion processes)	69.884	49.888	42.216	46.866	41.767	35.463	28.197
Industrial sector (process emissions)	31.509	23.287	20.591	18.549	16.923	16.850	16.817
Business and Institutional Residential Sectors	30.926	35.135	26.096	25.588	25.291	19.989	14.117
Agriculture	34.920	33.149	33.046	33.907	34.990	31.746	28.439
Waste	15.425	16.743	16.149	14.718	14.652	12.954	11.322
Refining industry	11.877	10.366	10.452	10.229	9.245	7.968	5.670
Other energy industries	1.036	3.619	656	989	785	831	757
Other sectors	11.744	11.190	12.713	12.754	12.699	11.640	11.096
Fugitive emissions	3.249	3.037	4.053	3.888	3.785	3.239	2.338
Use of products	958	977	641	920	945	1.024	1.069

[2] reporting system for EU countries (europa.eu)

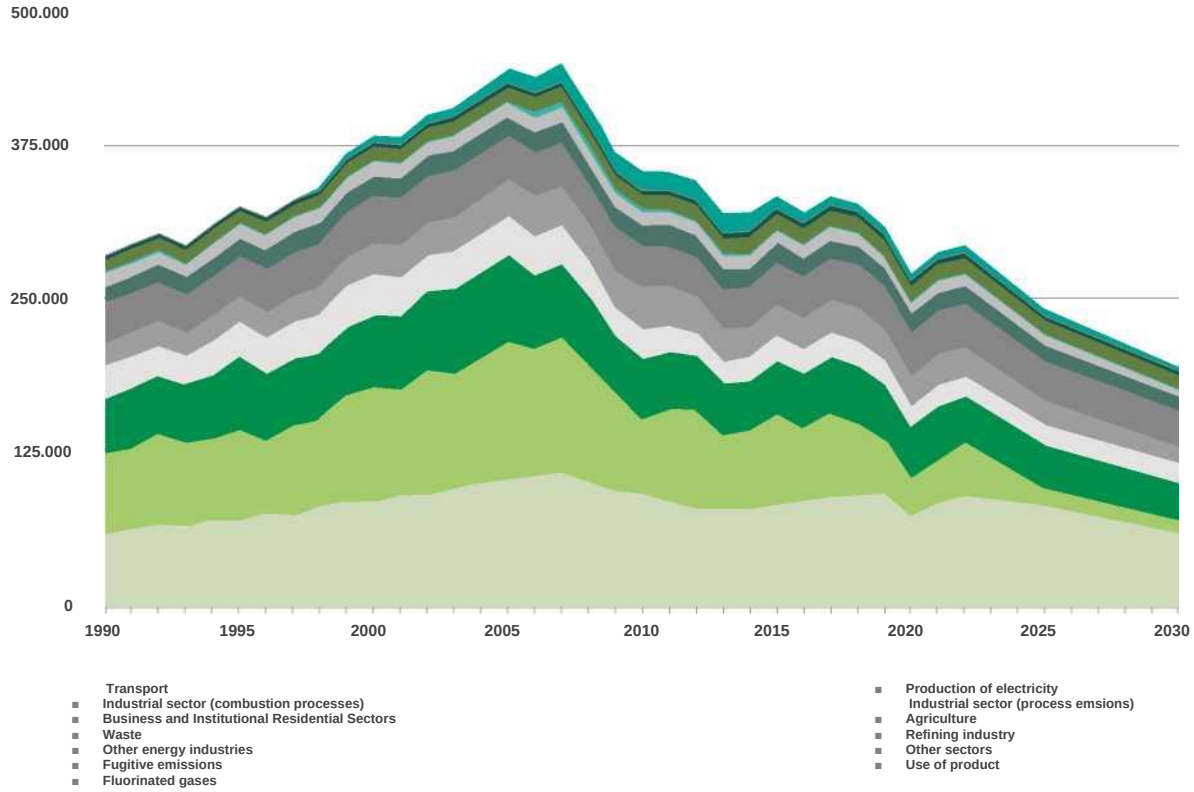
*********CIRCABC - EU energy and climate reporting - Library

Emission projection in PNIEC Scenario 2023-2030 ($ktCO_2eq$)*							
Years	**2005**	**2010**	**2015**	**2019**	**2020**	**2025**	**2030**
Fluorinated gases	10.597	14.729	8.748	5.739	4.968	4.543	3.688
Total	**437.749**	**354.497**	**333.190**	**309.583**	**270.669**	**242.161**	**195.189**

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

** The 2025 and 2030 emission projections are estimates of the Spanish Inventory System based on the results of the Energy Scenario of the PNIEC 2023-2030. Emissions up to 2020 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report.*

Figure 2.1 CO2eq emissions by sector. Historical and projection at 2030 (ktCO2eq)



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

** The 2025 and 2030 emission projections are estimates of the Spanish Inventory System based on the results of the Energy Scenario of the PNIEC 2023-2030. Emissions up to 2022 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report. Values between 2022 and 2025, and between 2025 and 2030 are interpolated linearly.*

According to the estimates of the Spanish inventory system, the planned decarbonisation in the electricity sectorwill reduce emissions by **32 MtCO2eq**. This reduction is the result of the significant penetration of renewable technologies envisaged in the Plan, which will gradually replace fossil-based generation. The renewableelectricity ge in 2030 will be **81 %** of the total, consistent with a trajectory towards a **100 % renewable electricity sector in 2050**. In order to enable this renewable integration, different figures are particularly relevant, which will giveflexibility to the electricity system, such as energy storage, demand management, aggregators or digitalisation of assets.

In the mobility and transport sector the expected reduction is **32 MtCO2eq**. This result is the resultof the modal shift from the conventional combustion vehicle to collective public transport, sharing and non-emitting modes, and as a result of the widespread **delimitation of low-emission zones in cities with more than 50.000 inhabitants from 2023 onwards**. This aspect is set out in Law 7/2021 of 20 May on climate changeand energy transition, Article 14 of which states that municipalities with more than 50.000 inhabitants and island territories will adopt sustainable urban mobility plans by 2023. Other aspects, such as measures to facilitate walking, cycling

or other active means of transport, or measures for the improvement and use of the public transport network, are also included alongside the Low Emission Zones.

In this regard, it should be noted that the most recent context, together with the legislation adopted and the support adopted, has led to new mobility habits, with both public transport and tele-ferrybeing significantly boosted, with its direct effect on mobility efficiency. It is also the result of the significant presence of **electric vehicles** expected in 2030: more than **5.5 million units**, including cars, vans, motorcycles and buses, as well as the use of sustainable or advanced **biofuels.** This sector is key to achieving the energy efficiency targets imposed by the new Fit for 55 package.

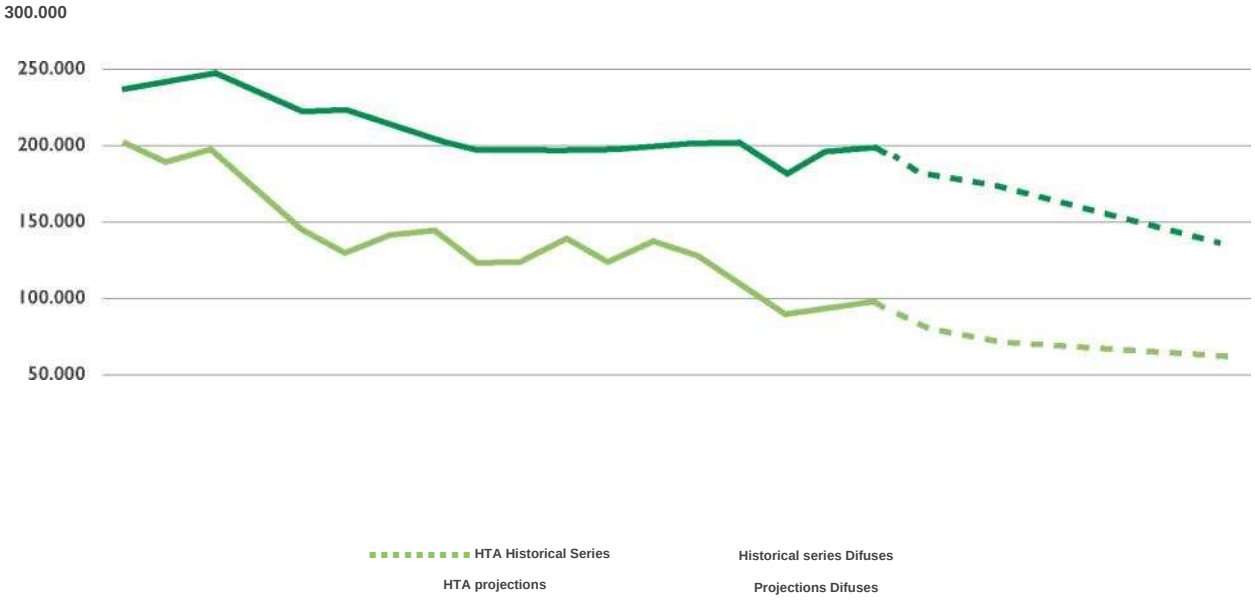
In the industry sector, both emissions from combustion processes and process emissions are reduced, although the largest reduction occurs in emissions from combustion, where mitigation **reaches 19 MtCO2eq** as a result of the displacement and reduction of fossil fuel consumption, as well as energy efficiency improvements.

The Plan foresees a **32 % reduction in GHG compared to 1990 levels,** which is an increase in ambition compared to the previous NECP. GHG reduction **compared to 2005 will reach 55 %.**

The decarbonisation analysis foreseen in the NECP is also addressed from the perspective of emissions that formpart of the EU ETS system and diffuse emissions (residential, transport, agriculture, waste, F-gases and non-emissions trading industry). As already mentioned, gross GHG emissions in 2019 were 309.6 million tonnes of CO2eq. Of these, 64 % were in diffuse sectors and 36 % in the sectors covered by emissions trading.

The measures set out in this NECP **allow an emission reduction level of 32 % tobe achieved at 1990 levels**. Diffuse sectors contribute a 42 % reduction in 2030 compared to 2005 levels, while emissions trading sectors contribute a 70 % reduction in 2030 compared to 2005.

Figure 2.2. Emission target 2030. Historical series (2005-2022) and projected trajectory

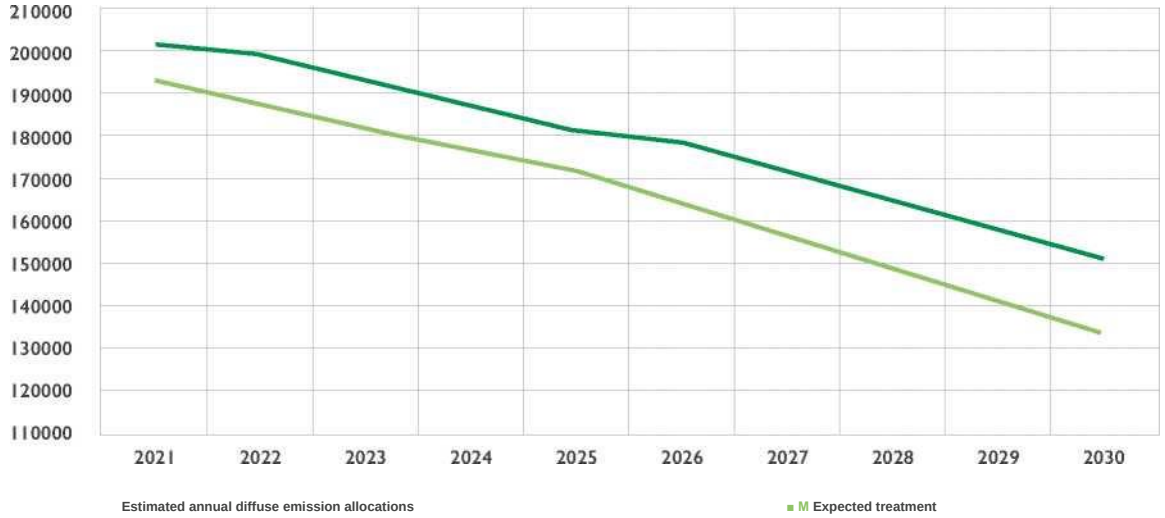


Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In this regard, Regulation (EU) 2023/857 of 19 April34 2023 sets greenhouse gas emission reduction targets for diffuse sectors at European Union and Member State level for the period2021 2030. In the case of Spain, the reduction commitment reaches -37.7 % in 2030 compared to 2005 levels. Figure 2.3 represents the annual cap on diffuse emissions for Spain over the period 2021-2030.

Figure 2.3. Emission allocations vs. projected trajectory, 2021-2030

34 Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member Statesfrom 2021 to 2030 supporting climate action to meet commitments under the Paris Agreement and Regulation (EU) 2018/1999



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The GHG reduction targets set out in this National Plan **not only comply with the binding targets laid down in EU legislation, but also raise ambition**, contributing to theachievement of the objective of reducing emissions across the European Union, as well as to international commitments**.**

Furthermore, the inclusion of the land use, land use change and forestry (LULUCF) sector in the Strategic Energy and Climate Framework is seen as a reflection of the recognition in the Paris Agreement of the role of sources and sinks in climate action.

Regulation (EU) 2018/841 (or 'LULUCF Regulation'), adopted in 2018, aims toincrease removals and reduce GHG emissions from the LULUCF sector. When originally adopted, no specific targetswere set, but a commitment was agreed at Member State level to ensure that emissions do not exceed removals under certain accounting rules (known as the 'non-debit rule'). The agreement to revise this regulation, reached at the end of 202235, sets a new EU target of 310 million tonnes of CO2eq by 2030 at EU level and sets individual targets for Member States from 2026 onwards (see Table 2.4. Targets for net greenhouse gas removals (MtCO2eq) below). This represents, for Spain, an increase in removals of around 14 % compared to today.

35 Regulation (EU) 2023/839 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/841 as regards the scope, simplifying the reporting and compliance rules and setting out the targets of the Member States for 2030, and Regulation (EU) 2018/1999 as regards improvement of monitoring, reporting, tracking of progress and review

Table 2.4. Targets for net greenhouse gas removals (MtCO2eq)

A	B	C	D
Member State	Average greenhouse gas inventory data for the years 2016, 2018 and 2017, submission of 2020 ($ktCO_2eq$)	Member States' targets in 2030 ($ktCO_2eq$)	Value of net greenhouse gas removals in 2030, submission of 2020 ($ktCO_2eq$) (Columns B + C)
Spain	— 38,326	— 5,309	— 43,635
EU-27	— 267,704	— 42,296	— 310,000

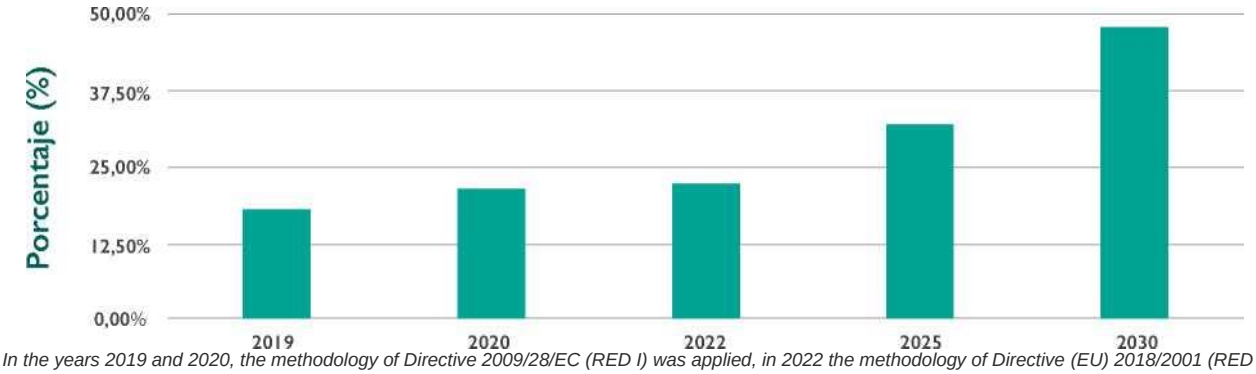
Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Electrification and decarbonisation of the energy system

Three out of four tonnes of GHG originate from the energy system, making **their decarbonisation key to achieving the objectives of this Plan**. In order to achieve this goal, a transition from fossil fuels to efficiency and renewable energy is needed. In addition, there is a need to electrify a significant partof technical and transport demand and to have an impact on an increasingly distributed and flexible system. This electrification of demand isparticularly taxed by self-consumption, which increases installation forecasts to 19 GW in 2030, which is expected to cover 11 % of demand.

As a result of the measures set out in this Plan aimed at reducing the use of fossil fuels and promoting renewable energy sources in the three energy uses – transport,calefac and cooling and electricity – **renewables reach 48 % of final energy use in 2030.**

Figure 2.4. Contribution of renewable energy to final energy consumption with the set of planned measures



In the years 2019 and 2020, the methodology of Directive 2009/28/EC (RED I) was applied, in 2022 the methodology of Directive (EU) 2018/2001 (RED II) was applied and in the 2025-2030 projections the methodology of Directive (EU) 2018/2001 as amended by Directive (EU) 2023/2413 (RED III) was applied.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Transport

As a result of the measures adopted in this Plan, the greenhouse gas intensity of the transport sector is reduced by 16.3 %, above the 14.5 %[36] required by the European Union in 2030.

The main decarbonisation axes in the transport sector are modal shift, the deployment of electric mobility and the use of advanced biofuels. The first two axes are included in this Plan as measures for efi energyscience.

Electrification and growth of the use of thermal renewables.

Heating and cooling

In the heating and cooling sector, in addition to continuous technological improvement, new actors and investment models are expected to emerge that drive decarbonisation. In this regard, this Plan focuses on genomic communities,- proposing regulatory development to enable them to exercise their right to generate, consume and sell renewable energy, and, in addition, to promote a series of administrative and economic measures. An increase in the use of electricity for heat generation is also proposed.

According to the plan's projections, the increase in renewable energy is highly relevant in all sectors of the economy.

In short, the presence of renewables on energy end-use increases from **17.9 % in 2019 to 48 % in 2030.**

The plan's measures achieve 81 % of renewable generation in the electricity mix in 2030.
The transition to a decarbonised electricity system implies a significant and sustained uptake of renewable sources, as well as solutions that provide flexibility to the system, such as energy storage or demand-side management.

Integration of renewables in electricity generation

Achieving the ambitious targets for electricity from renewable energy sources implies a strategy in three directions: promotion of major generation projects, deployment of self-consumption and distributed generation and measures to boost flexibility, such as energy storage or demand-side management, toenable the integration of renewables into the electricity system and market.

The large-scale development of renewable energy in the last decade at international level has reduced its relativecosts to such an extent that, in the vast majority of situations, renewable sources, mainly wind and solar, generate the most economical electricity when it comes to developing new capacity.

By 2030, the plan foresees a total installed capacity in the electricity sector of 214 GW, which is 34 % higher thanthat contained in the previous NECP. With regard to the planned deployment of renewable technologies for the electricity sector, various tools are relevant, such as the establishment of auction calendars that order the entry of new renewables, bringing forward to consumers the savings they entail on their bills, the processing processesthat ensure compliance with environmental criteria, or the management of grid access permits,which prioritise projects with the highest benefits.

In order to achieve these objectives in the development of renewable energy technologies, it is important to work together with the autonomous communities and economic and social actors to ensure that the deployment of renewables is made in a manner compatible with the territory, thus ensuring viable, sustainable and efficient development.

36 Council and Parliament reach provisional deal on renewable energy directive

Of particular importance is the promotion of **renewable self-consumption,** facilitated by the existence of renewable resources throughout the national territory, the PRTR lever, which has allocated around EUR 2.000 million to impose on it, the modularity of installations, the reduction of costs and the new regulation introduced since 2018, which simplifies activity, abolishes tolls and charges for self-produced energy and allows for financial compensation for surpluses injected into the network. Indeed, the framework introduced in recent years has allowed for an almost exponential roll-out of self-consumption, **making it possible to increase the forecasts of the 2030 self-consumption roadmap.**

Self-consumption **The forecasts in the Self-Consumption Roadmap are exceeded to 19 GW of self-consumption installed by 2030, which are estimated to cover 11 % of demand.**

It will also be essential to integrate solutions that bring flexibility to the electricity system, favouring the penetration of renewables and providing quality and security of supply. In this regard, figures such as energy aggregators or demand management are particularly relevant, and the deployment of energy storage, both daily, weekly and seasonal, as well as on a large scale and behind the meter, which increases its forecast to 22.5 GW, is key.

With this in mind, and in a context of boosting the electrification of the economy, the Scenario proposed by the Plan significantly increases renewable generation capacity compared to the current situation.

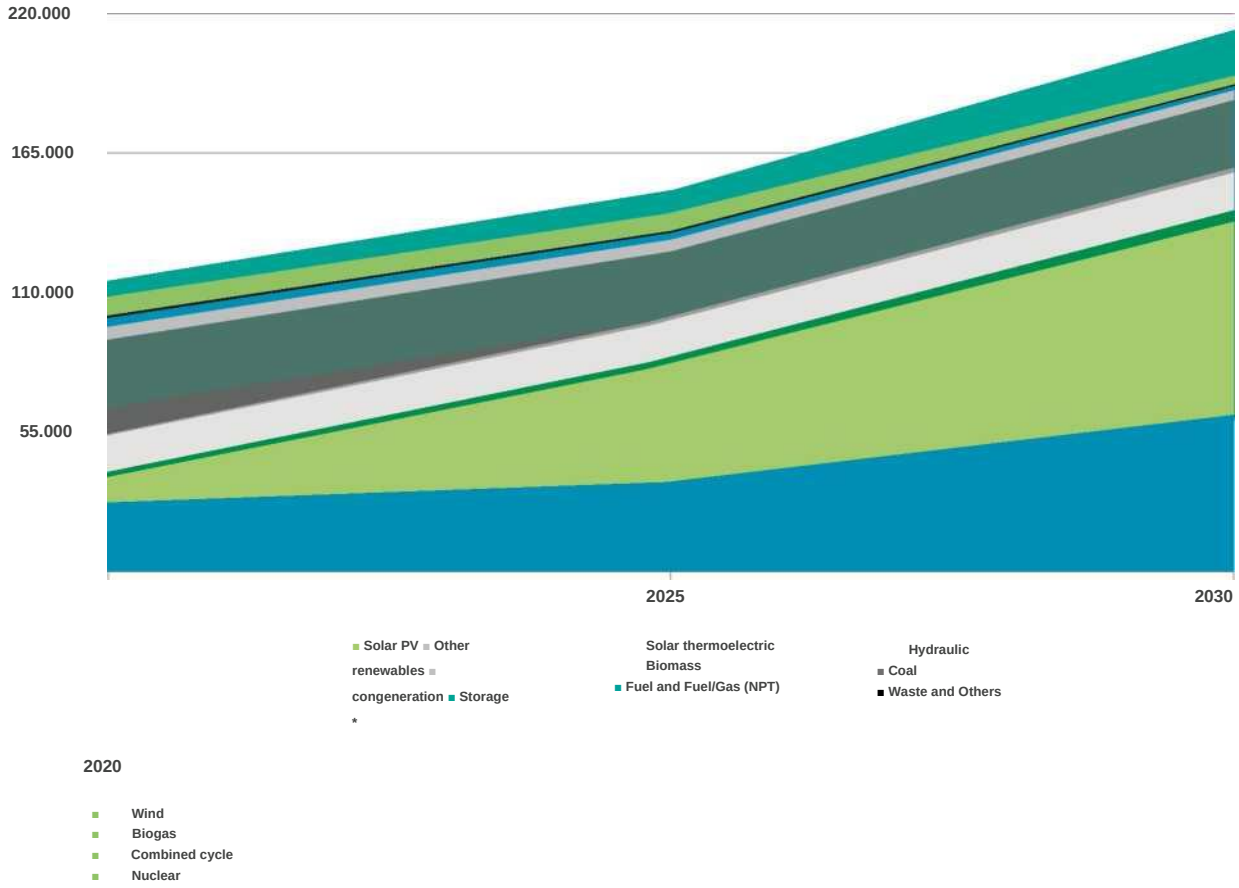
Table 2.5. Evolution of gross installed electrical power (MW)

PNIEC 2023-2030 generation park. Gross power (MW)				
Years	**2019**	**2020**	**2025**	**2030**
Wind	25.583	26.754	36.149	62.054
Solar Photovoltaic	8.306	11.004	46.501	76.277
Solar thermoelectric	2.300	2.300	2.304	4.804
Hydraulic	14.006	14.011	14.261	14.511
Biogas	203	210	240	440
Other renewables	0	0	25	80
Biomass	413	609	1009	1409
Coal	10.159	10.159	0 * *	0
Combined cycle	26.612	26.612	26.612	26.612
Cogeneration	5.446	5.276	4.068	3.784
Fuel and Fuel/Gas (Non-Peninsular Territories)	3.660	3.660	2.847	1.830
Waste and other	600	609	470	342
Nuclear	7.399	7.399	7.399	3.181
Storage *	6.413	6.413	9.289	18.913
Total	**111.100**	**115.015**	**151.173**	**214.236**

** Including solar thermoelectric storage reaches 22.5 GW.*
** * the closure of coal generation shall be subject to an assessment by the System Operator of compliance with the system's security of supply criteria, as laid down in Article 137 of Royal Decree 1955/2000.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Figure 2.5. Evolution of installed capacity by technology (MW)



** Includes daily, weekly and seasonal storage. Including solar thermoelectric storage reaches 22.5 GW. The data for 2025 and 2030 are estimates.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A notable new development included in the final document of the 2023-2030 NECP is the adjustment of the pathof cutting renewable power in the electricity sector for 2025 as a result of the necessary legislative amendments introduced by Royal Decree-Law 8/2023 on the orderly incorporation of production facilities of renewable origin into the electricity system regulated by Royal Decree-Law 23/2020. These measures will facilitate a staggered entry of all renewable power, which justifies amending the PNIEC Scenario 2023-2 030 in 2025 while maintaining the same level of ambition for 2030.

In the case of cogeneration, the power shown corresponds to installed power, both active and inactive.

The actual distribution by renewable technologies between 2021 and 2030 will in any event depend on the costof such technologies, as well as on the feasibility and flexibility of their deployment, including environmental viability, so that their relative weight may vary, within a certain margin, from the figures presented here[37]**.**

37 With regard to the possible actions in hydroelectric and hydraulic pumping systems referred to in this section, account shall be taken of the possible hydromorphological effects on rivers, as well as their river regime and contributions in the affected stretches, as they could affect 'good water status', an objective set out in the Water Framework Directive and the corresponding river basin management plans. In accordance withArticle 4 (7) of the WFD, the exceptional nature of the action will be justified.

The path towards meeting the targets set for 2030 is based on the principles of techno-logic neutralityand cost-efficiency. To this end, the energy modelling carried out takes into account the evolution of the performance and costs of all technologies and is based on cost minimisation, respecting the contours conditions for meeting the objectives of the five dimensions of the NECP (see Annexes A and B).

To sum up, the Plan proposes a balanced and diverse development of the renewable generation fleet, providing medium-term visibility for each of the technologies, and aiming to combine the strengths of the various alternates, seeking the least cost to consumers, the availability of the resource, flexibility services that bring added value to the system and facilitate the integration of renewables, and that the deployment of renewables should be made in a manner compatible with the territory.

2.1.1. Adaptation to climate change

Law 7/2021 of 20 May 2007 on climate change and energy transition includes adaptation to the impacts of climate change and lays the foundations for the planning and programming system in this area. It also identifies a numberof sectoral areas for which it lays down a series of mandates in this area, highlighting: climate and climate scenarios; human health; water and water resources; energy; city, urban planning and building; biodiversity and protected areas; forest, soil and desertification and agriculture and livestock farming.

Article 17 of the Law states that the National Climate Change Adaptation Plan (PNACC) is thebasic planning step to promote coordinated and coherent action against the impacts of climate change. The NAPCP thus defines objectives, criteria, areas of work and lines of action to promote adaptation and resilience to climate change.

Spain has been one of the first European countries to develop a national adaptation policy, materialised in 2006 with the adoption of the first NAPCP, and which was in force until 2020, when the new NCP for the period 2021-2030, which forms part of the Strategic Energy and Climate Framework, was approved.

The NAPPs are developed through Work Programmes. Two programmes covering the period 2021-2025 and the period 2026-2030 respectively are foreseen in this second planning cycle:

Table 2.6. Development of National Climate Change Adaptation Plans (NECPs)

Plan	Adoption year	Period of the Plan	Work programmes	Period of the Work Programme
NAPCP	2006	2006 – 2020	1TH	2006 – 2008
			2TH	2009 – 2013
			3TH	2014 – 2020
PNACC 2021-2030	2020	2021 – 2030	1TH	2021 – 2025
			2TH	2026 – 2030

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

As in the first Adaptation Plan, the PNACC 2021-2030 defines a set of areas of work including the energy system.

Specific objectives are defined in this area to address the risks affecting the various components of the energy system:

- Improve knowledge of the impacts of climate change on renewable energy production potentialsand translate the results into energy planning.
- Improve knowledge of the potential impacts of climate change on the functionality and resilience of energy generation, transport, storage and distributionissues and specify adaptation measures to avoid or reduce the risks identified.
- Improve knowledge on the impacts of climate change on energy demand and identify measures to avoid or limit peak demand, especially those associated with heat.

- Identify risks arising from extreme events in critical energy infrastructure and implement measures toavoid their loss of functionality.

In the field of energy, the NACC underlines the importance of taking into account the potential impacts of theMLC change throughout the energy transition process. The projections point to an increase in average temperature and a gradual reduction in water resources in Spain. All studies anticipate a sharp increase in the risk of droughts, which will be more frequent, longer and intense, and floods, with more frequent flooding and higher peak flows. Adverse weather events, such as heatwaves or tars, are also expectedto be more frequent and likely to affect coastal energy installations.

Accordingly, adaptation actions in other areas of work have an impact on the levels of resilience of the Spanish energy system to climate change. This update of the NECP therefore incorporates as a novelty (Measure 6.2) the specific measures of the NAPCP which, through its Work Programmes (PTs), contribute to transformation of the energy system towards a more climate-resilient model. The drafting of this Plan is one of the first steps to build adaptive capacity and provide actions for better adaptation of the energy system. Data collection and forecasting is a necessary approachto transforming the energy system so that policy guides and policy design can be drawn up, with the aim of achieving a carbon-neutral economy.

The measures contained in the decarbonisation dimension and the design of an energy mix with a higher presence of renewables improve adaptation as they reduce the negative impacts related to water-intensive consumption by thermal and nuclear power plants, and their response to temperature increases. In addition, measures aimed at increasing storage capacity through various sources and at managing demand will allow for better adaptation to a possible decrease in water resources for electricity production.

Similarly, the energy efficiency principle of the Plan leads to a reduction in energy demand in the medium and long term, which implies adaptation to climate change, as the energy system does not subject the energy system to high energy requirements, especially at peak demand in heat waves. This Plan includes the implementation of measures in the industry to initiate changes in production processes towards those with the technicalimprovements available.

The other dimensions also include complementary measures that contribute to better adaptation. Improved security of supply, reduced reliance on fossil fuels, together with measures dedicated to improving research and competitiveness in low-carbon technologies, contribute to the implementation ofa climate-resilient energy system.

Finally, in order to meet the information objectives set out in the Paris Agreement and international and European standards, MITECO, in cooperation with other ministerial departments and

autonomous communities, will draw up and publish regular reports on the evolution of the impacts and risks arising from climate change, as well as on policies and measures aimed at increasing resilience and reducing vulnerability.

2.1.2. From generation to demand management and storage

The**development of a system based on renewable generation makes it necessary to plan the integration of thesetechnologies into the system. The base and peak generation paradigm**becomes a new paradigm of variability *versus* flexibility. The plan seeks system flexibility by allowing demand management and storage to contribute to optimal integration of renewables, as well as to security and quality of supply, reducing dependency and improving security of supply.

Solutions that bring flexibility to the system are promoted, including both the development of energy storage and demand-side management, which are key to promoting the integration of renewables in the electricity sector.

The future provision of energy will mainly come from renewable sources in many cases intermittent and non-manageable. Energy storage will be one of the main elements providing flexibility to the energy system. The **Energy Storage Strategy**, adopted in February 2021, already identified the prin cipaleschallenges for the deployment of energy storage, the measures needed for its effective deployment in a context of creating a new energy system model, with the twin goal of climate neutrality and the leveragingof the opportunities that this change brings.

The Energy Storage Strategy, adopted in February 2021, envisages a storage capacityof around 20 GW in 2030 and reaching 30 GW in 2050, considering both large-scale storage, distributed storage and/or after the meter, with both daily, weekly and tational storage-technologies. Two years later, the need to incorporate storage has been reinforced by the Commission Recommendation of 14 March 2023 on energy storage and to support a decarbonised and secure EU energy system, where, in line with Spain's strategy, it is stated that different energy storage technologies can provide various services at different scales and for different time frames, can be a technical solution to provide stability and reliability, contribute to system integration. to the customof supply and, in less interconnected or non-interconnected energy systems such as islands, flexibility resources such as energy storage can be of great help to move away from fossil fuelsand manage high levels of short-term and seasonal variability in renewable energy supply.

With the current version of the NECP, the strategy's forecasts are exceeded by reaching 22.5 GW in 2030,out of 12.5 GW of daily and weekly storage, while 10 GW correspond to seasonal storage. The precise composition and operation will be developed according to the evolution and availabilityof technológi and the specific needs of the network in terms of the technical characteristics required for its operation. Both *stand-alone* or standalone technologies and hybrids with renewable generation are expected to be developed.

Electricity **demand management** is the set of actions carried out, directly or indirectly, by consumers themselves, by public administrations, energy distributors and traders, energy service companies and independent aggregators, on consumers' energy demand in order to change the timing or scale of their level of energy demand. This contributes to cost reductions, lower impact on the environment, improved consumer competitiveness and efficiency in the use of generation, transmission and distribution systems.

Instruments to promote demand-side management can be economic incentives, introduction of more efficient technologies and techniques, or influence consumer habits. To this end, it is proposed **to develop the aggregator and demand management plans**, whereby different actors can participate in key services to the system.

Along this lines, Royal Decree-Law 17/2022 of 20 September38creates an active demand response service, confused asa specific balancing product in accordance with European legislation, which held its first auction on 20 October 2022, allocating around 500 MW.

38 Royal Decree-Law 17/2022 of 20 September 2007 adopting urgent measures in the field of energy in the application of the remuneration scheme to cogeneration installations and temporarily reducing the rate of value added tax applicable to the intra-Community supply, taxationand acquisition of certain fuels.

A second auction took place on 4 December 2023 allocating a total of 609 MW power with a marginal price of EUR 40,82/MW.

In order to meet these objectives and as further developed below,measures relating to managemability and storage are strengthened and increased compared to the original NECP. Among others, the new market design, as well as concrete instruments such as capacity mechanisms, provided for in this NECP, should provide the right signalsfor investments in storage, while looking at specific opportunities both in separate or hybrid storage facilities, in distributed systems, or after the meter, which can also participate in local energy markets.

Similarly, the European Commission's assessment of the draft NECPs, carried out at the end of 2023, underlines the commitment to promote flexibility through energy storage with ambitiousenergy storage targets, and a strategy dedicated to it, as well as the redesign of the Spanish capacity mechanism, as essential elements for meeting the objectives, highlighting, in addition, the identification of the regulatory mechanisms needed to develop storage, their importance in managing system congestion or invsionsaimed at boosting storage, with particular reference to island systems. It also highlightsthe lack of flexibility for the optimal uptake of renewables in the electricity sector, as well as measures to digitalise networks and facilitate participation in new flexibility services.

2.1.3. The role of citizens in the energy transition

At the end of 2016, the European Commission's so-called "Winter Package" proposed putting citizens at the heart of the energy transition. In this spirit, Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources includes in its articles that Member States must **guarantee consumers the right to produce, consume, store and sell their own renewable energy**, and assess both the barriers and the development potential of **renewable energy communities**.

Self-consumption and energy communities will be two key components in energy democratisation. Both Royal Decree 244/2019 of 5 April, regulating the administrative, technical and economic conditions for self-sufficiency ofelectricity, and the future Royal Decree regulating energy communities, are essential in promoting these figures, which are taking a leading role in the energy transition in recent years. It isalso worth drawing attention to the impetus provided by the aid lines for these two categories, through Royal Decree 477/2021, for self-consumption facilities that include the incorporation of storage after the meter, or the EC Programmes implement and CE Offices for the development of energy communities. This financial support for both self-consumption and energy communities has been significantly strengthened in the addendum to the PRTR.

There is now a new reality in which there are many renewable projects that require action to be taken in the identification of the development areas of facilities, taking into account two factors: cooperation with theregional authorities and ensuring the creation of benefits for local communities. The latter dimension is particularly important to ensure the success and effectiveness of the green transition.

The transition to a model based on renewable energies also makes it possible to democratise the energy system and offers new opportunities for citizens, corporations and local authorities, who in the Conven cionalmodel were consumers only and can now be proactive players. This involvement of new players and the development of self-consumption makes it easier for citizens and businesses to perceive the benefits of renewable generation, encourage new sources of investment in decarbonisation, better integration and acceptance of energy infrastructurein the territory, reduction of transport and distribution losses, use of urban space for renewable generation, greater energy and climate awareness in society and the emergence of newbusiness.

The **right to access energy** is another fundamental axis of changing energy model. In this regard, they highlight the potential of energy renovation of buildings and self-consumption systems – in particular partially-owned self-consumption– to mitigate situations of vulnerability and energy poverty. These measures are complemented byspecific actions to eradicate energy poverty, in the framework of the National Strategy against Energy Poverty.

Similarly, knowledge and information are the basis for greater involvement of citizens in the energy field. For this reason, dissemination programmes are planned to allow a better understanding of their relationship withgentle and the right to access, for example, their own energy consumption data in an agile and comprehensible manner.

Furthermore, as a tool to promote public participation in climate action, Article 39 of the Law on Climate Change and Energy Transition mandates the Spanish Government to strengthen the existingpartici pation mechanisms through the establishment of a Citizens' Climate Assembly at national level. Set up in 2021, the assembly issued a final report setting out the conclusions of its six working sessions, structured around five thematic axes, the Life and Society Areas (AVS) of ecosystems, community, health and care; consumption,-mitigation and land use and work. Completed in May 2022, the report lists 58 objectives, which in turn break down into 172 recommendations.

The 2023-2030 NECP proposes instruments and measures to facilitate and strengthen the role of energy communities and the role of new actors in the energy transition, as well as to guarantee the right to access energy.

Furthermore, while the NECP indirectly contributes to the achievement of much of the objectives set by the Citizens' Climate Assembly, 24 objectives are identified in which this plan includes measures that contribute directly to its implementation. In particular:

- Promote green and sustainable architecture and make it easier for the building stock (both new andexisting buildings) to adapt quickly and easily to the best existing energy and water consumption standards
- Facilitating energy savings and consumption of renewables
- Reducing GHG emissions from freight transport
- Boosting, optimising, restructuring and improving sustainable mobility with efficient and clean public transport infrastructure
- Reducing the climate change impact of air mobility

- Reducing car use
- Working towards a just transition, both in internal migration and in forced migration, proves nascentfrom other countries and, at the same time, seek synergies between migration and the exploitation ofexisting and unexploited infrastructure (Spain)
- Increasing awareness, knowledge and sensitivity to the consequences and impacts of climate change and ways to address it in the training context
- Engaging society to act on climate change, encouraging changes in habits and practices
- Disseminating and universalising information on climate change that is truthful, science-based, clear, pedagogical and accessible, avoiding the spread of false information
- Protecting the countryside from activities with a high environmental impact, thereby increasing the quality of life
- Fostering climate resilience by equipping them with mechanisms and resources to be able to understand the risks of climate change- and foster citizen response to manage them, through individual and community responsibility
- Fostering social cohesion and equality for a just transition at all levels: employment, health, education, etc.
- Secure and effective action against climate change, not dependent on changes between governments
- Adapting housing to climate change for people in vulnerable situations or in need of specific care
- Reducing the sensitivity of workplaces to the potential impacts of climate change, harnessing their environmental conditions to improve energy efficiency
- Reduce businesses' dependence on non-renewable energy by promoting the use ofrenewable energy and self-consumption
- Achieving efficient and environmentally responsible processes in companies that ensure optimisation offrequencies and reduction of GHG emissions
- Prioritising sustainable mobility and reducing private car transport to workplaces to limit $CO2_{emissions}$
- Reducing the impacts of companies and productive sectors and services, facilitating their reconversion and that of theirworkers, ensuring a just transition
- Promoting research, development and innovation (R & D & I) to advance a decarbonised economy, fostering the circular economy, territorial balance and alliances between universities, businesses and societal groups of stakeholders
- Place new wind and photovoltaic farms in areas of low ecological and environmental sensitivity, including marine areas
- Disseminate accurate and science-based information on climate change
- Increasing societal interest in climate change

2.2. Dimension energy efficiency

2.2.1. National energy efficiency target for 2030

The energy sector is undergoing disruptive transformations, particularly in the area of energy efficiency. Hence the importance in the strategy put forward by the European Union, with the milestones identified at 2030 and 2050, reflected in both 'Fit for 55' and 'REPowerEU', which establishes the decarbonisation of the economy as a key driver in energy actions, while maintaining the importance of efficiency in the processof setting the 2040 targets. As the European Commission points out, in order to achieve these objectives, priority must be given to energy efficiency, in line with ***the energy efficiency first principle.*** 39

This principle is defined in Article 2 (18) of the Regulation on the Governance of the Energy Union and Climate Action, which states that*"Energy planning, strategy and investment decisions should take full account of alternative, cost-efficient and more efficient energy demand and supply measures, including through end-use energy savings, demand response initiatives and more efficient transformation, transmission and distribution of energy, while still achieving the objectives of those*decisions".

This should analyse the implications of energy efficiency and its impact on citizens and businesses. This plan provides concrete responses, pushing for a profound transformation by saving energy in various economic sectors, and giving citizens a role in the energy landscape, with greater capacity for decision making and management of energy consumption.

Energy efficiency involves technology, knowledge, assessment indicators and monetisation of savings, whichare prone to reducing energy consumption. There are basic issues that are pushed forward, starting with the economic dimension of energy savings. Alongside monetisation and technology, it is essential to have data for their analysis, as well as to develop indicators and statistics to measure the savings made by the euro invested.

This is thanks to the significant efficiency measures promoted by the Plan, which is expectedto achieve ambitious emission mitigation targets as renewables penetration into energy end-use. Efficiency measures are central in all sectors of the economy with a particular focus on transport and industry, closely followed by the buildings sector, both residential and tertiary. Taken together, they make it possible to achieve the objectives in a cost-effective manner, also contributing to the expected positive impacts on the economy and employment (see Chapter 4).

The NECP's commitment to energy efficiency also incorporates environmental and territorial benefits, as set out in the Strategic Environmental Study. Increasing energy efficiency not only leads to a reduction in fossil fuel consumption, with its consequent benefits, but also results in a reduction in energy needs as a whole, resulting in a lower need for renewable deployment, reducing landoccupation and associated infrastructure deployment.

Directive 2012/27/EU on Energy Efficiency established a common framework of measures to promote energyscience within the European Union with the aim of ensuring efficiency gains by 20 % by 2020 and 32.5 % by 2030. Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) sets an indicative target of an indicative improvement of 40.5 % in primary energy and 38 % binding in final energy compared to the reference scenario projected by the European Commission's PRIMES 2007 model for 2030 (recast).

With reference to the binding final energy target, this update of the NECP, with the measures put in place and in accordance with the modelling exercise carried out, **will increase**40 **the energy efficiency improvement by up to 43 % in 2030,**compared to 38 % at European level, resulting in final energy consumption (not including non-energy uses) of **71,7 Mtoe** in that year.

---

39 *Energy Efficiency First principle*: Commission Recommendation (EU) 2021/1749 of 28 September 2021 on***Energy Efficiency First***: guidelines and examples for its implementation in decision-making in the energy sector and beyond.

40 In comparison with the forecasts for 2 030 in the PRIMES Model (2007) of the European Commission, which provides the reference in the Energy Efficiency Directive for establishing the indicative target for primary energy consumption in the European Union in 2030.

Spain has a high climate ambition and is very much in line with the objectives of the Fit for 55 package, which is one of the Member States with the highest contribution to the collective effort on energy efficiency. Despite this, the reference scenario 2020 set by the EED as the basis for determining the primary energy and Fi Ni targetsdoes not adequately reflect the reality of the Spanish energy system, which undermines the Spanish contribution to these targets. This has been communicated to the European Commission on numerous occasions, both at technical and executive level, since September 2021. For this reason, for the calculation of the energy efficiency targets in this Plan, the 2030 projections of the European Commission's PRIMES-2007 model are retained as the baseline.

The European Union's objective of improving energy efficiency by 38 % by 2030, as a result ofthe measures set out in this Plan, is expected to achieve an improvement in efficiency of 43 % compared to the PRIMES 2007 baseline.

Table 2.7. Evolution of final energy consumption excluding non-energy uses (ktoe)

Final energy consumption excluding non-energy uses in the PNIEC Scenario 2023-2030 (ktoe)				
Years	**2019**	**2020**	**2025**	**2030**
Coal	446	396	241	189
Petroleum Products	44.373	34.133	36.237	28.035
Natural gas	14.456	13.819	13.272	11.085
Electricity	20.166	18.887	20.758	23.543
Renewable	5.895	5.511	7.351	8.449
Other non-renewables	217	193	353	408
Total	**85.553**	**72.939**	**78.213**	**71.709**

** Data for 2025 and 2030 are estimates.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Spain is already on the path to decarbonisation. Regulatory and fiscal measures to accelerate the transition to a low-carbon economy have been approved and will continue to be proposed. The competition of all territorial administrations allows us to make progress in this process of energy transition, in which theautonomous communities and local authorities play a key role. The model for the distribution of competences in our country, where the General State Administration, the Autonomous Communities and local authorities share competences in different areas, requires coordination, especially in certain areas of importance, inorder to transform our cities, such as urban planning and mobility.

In this regard, this NECP focuses on the efficiency and decarbonisation of industry; modal shift,decarbonising and transforming rail and maritime transport, reducing traffic, using educational publictransport, sustainable mobility and electrification of energy consumption in the transport sector. It also advocates the energy renovation of the building stock already built and the introduction ofefficient heating and cooling networks, so cities and their municipal governments must be important active agents of change.

The reduction in final energy consumption proposed in this NECP is equivalent to 1.6 % per year since 2019, which, linked to an expected increase in GDP over the same period of around 1.1 %, will result in **an improvement in the finalenergy insity of the economy of 3.1 % per year until 2030.** This improvement in final intensity is the result of the application of energy efficiency technologies, included in the catalogue of energy end-use energy efficiency measures (see chapter 3), as well as the increased penetration of renewables.

As a result of the policies and measures contained in this Plan, primary energy consumption (excluding non-energy uses) will decrease by a year-on-year rate of 1.8 % between 2019 and 2030, to 98,4 Mtoe.

2.2.2. Cumulative final energy savings target 2030

The successive Energy Efficiency Directives require Member States to demonstrate the achievement of a cumulative final energy

savings target for the period from 1 January 2014 to 31 December 2020 and thereafter from 1 January 2021 to 31 December 2030.

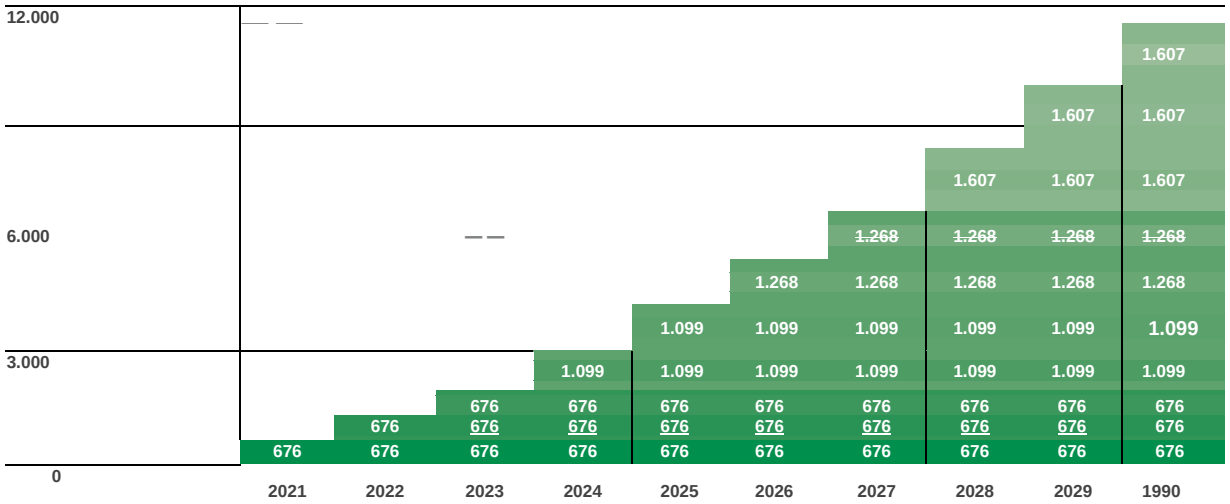
This cumulative final energy target has been calculated in accordance with Article 7 of the previous Energy Efficiency Directive (Directive (EU) 2018/2002 amending Directive 2012/27/EU onenergy science). For the first of the periods, it amounted to 15.979 ktoe, equivalent to 571 ktoe/year of new and additional final energy savings, assuming a linear distribution of the target over the period. In addition, the cumulative final energy savings target for the second of the periods originally **amounted to 37.206 ktoe**, equivalent to achieving new and additional savings each year, from 1 January 2021 to 31 December 2030, of 676 ktoe/year.

However, with the adoption and entry into force of the recast Energy Efficiency Directive (Directive (EU) 2023/1791), a new cumulative final energy savings target value for the period 2021-2030 of an average of 1.49 % has been established in Article 8, based on a staggered increase in the intensity of the target:

- 0.8 % for 2021-2023
- 1.3 % for 2024-2025
- 1.5 % for 2026-2027
- 1.9 % for 2028-2030

Thus, the total cumulative volume of final energy savings for the period 2021-2030 amounts to 53.593 ktoe.

Figure 2.6. Cumulative final energy savings target: 2021 – 2030



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Thus, 53.593 ktoe would be the value of the cumulative final energy savings target if the calculation base reduction mechanisms and the flexibilities allowed under Article 8 (6), (7) and (8) of the Energy Efficiency Directive are not applied.

In this respect, it should be noted that **Spain will benefit from and apply all the flexibility mechanisms allowed by the Directive** (Article 8 (6), (7) and (8)), whenever possible, i.e. provided that it achieves the savings target for the years 2021, 2022 and 2023 (676 ktoe/year or a cumulative 2030 of 18.252 ktoe). In such a case, and in accordance with the provisions of the Directive, flexibilities will only apply to the first three years of the obligation period. Despite this restriction in the years of application, the result can have a considerable impact, as they are the years with thehighest multiplier effect and thus the years that contribute most to the cumulative value of the target.

In no case, in accordance with Article 8 (9), the flexibilities applied may together lead to a reduction of more than 35 % of the amount of energy savings calculated in accordance with paragraphs 6 and 7.

Calculation of the percentage of the cumulative final energy savings target to be achieved from energy poverty alleviation actions, in line with Commission Recommendation (EU) 2024/1590 of 28 May 2024 on the transposition of Articles 8, 9 and 10 on energy savings obligation provisions of Directive (EU) 2023/1791 on energy efficiency

Article 8 of the Directive lays down, in the third subparagraph of paragraph **3 thereof, the obligation to obtaina share of the cumulative final energy savings ob from vulnerable or energy poor households**.

The percentage of the cumulative energy savings target to be achieved from energy-poor mitigation actionsis calculated as the arithmetic average of the following four indicators:

- inability to maintain the dwelling at an appropriate temperature (Eurostat, SILC [ilcappendix mdes01]);
- arrears in the payment of utility bills (Eurostat, SILC [ilcoutlining mdes07]);
- the total population living in dwellings where the roofs are leaked or where walls, floors or foundations are humane, or whose window frames or floor are rotary (Eurostat, SILC, [ilcoutlining mdho01]);
- at-risk-of-poverty rate (Eurostat, SILC and European Community Household Panel surveys [ilc-li02]) (percut-off rate: 60 % of median equivalised income after social transfers.

The value of each of these indicators, referring to Spain for 2019, as required by Article 8 (3) of the Direc, was obtained from the Eurostat database:

Table 2.8. Energy poverty indicators for the year 2019

Indicator	Eurostat link	Value
Inability to keep home adequately warm	Eurostat, SILC [ilcappendix mdes01]	7,5
Arrears on utility bills	Eurostat, SILC [ilcappendix mdes07]	6,5
Total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor	Eurostat, SILC, [ilcappendix mdho01]	14,7
Rate of poverty risk	Eurostat, SILC, [ilc-li02][41]	20,7
Arithmetic mean of indicators		**12,35**

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Thus, 12.35 % of the total cumulative final energy savings target should come from actions aimed at alleviating energy poverty or targeting vulnerable groups.

2.2.3. Sustainable Mobility Strategy 2030

This strategy, which will guide the actions of the Ministry of Transport and Sustainable Mobility (MITRAMS) on mobility, infrastructure and transport in this decade, implies a paradigm shift from a vision focused on the provision of transport infrastructure and services, to being a genuine national mobility and transport policy as a whole, which sees mobility as a right, an element of social cohesion and economic growth. This means prioritising investments that optimise the use of infrastructure and actions thatdeliver greater social benefit, such as everyday mobility solutions, digitalisation, intermodality or security. The Strategy is based on the three basic principles that give it its name: Security, Sustainability and Connectivity, energy efficiency being one of the key factors of the second principle to achieve the objectives.

Promoting a more sustainable and efficient transport system has as its main objective the reduction of greenhouse gas emissions, the improvement of air quality, the promotion of the health and well-being of the population, and the promotion of a fairer and more accessible mobility model that takes into account the needs of vulnerable users.

Another key issue incorporated by the Strategy is the digitalisation of all modes of transport, taking into account information sharing systems, which will make it easier for businesses to offer mobility services that are more efficient and reduce consumption in the transport sector.

In this regard, the strategic lines should focus on the following actions:

- Promoting the interoperability of urban transport modes, both collective and compactmobility, by improving infrastructure, and expanding the public transport network and services.
- Boosting the electric vehicle and creating adequate charging infrastructure, through economic and fiscal incentives for the installation of publicly accessible recharging points or for fleets, the incorporation of electric vehicle fleets in public transport and in companies, and encouraging the replacement of conventional vehicles with electric vehicles.
- Integrating urban planning with sustainable mobility, promoting the development of smart cities, with a design designed for pedestrians and cyclists, creating low-emission zones and limiting the use of private vehicles in densely populated areas, especially those with a risk of exceedances of pollution levels or emission limit values.
- Implementation of measures to improve the efficiency of freight transport, such as the promotion of sustainable urban logistics, the consolidation of loads, the use of low-emission vehicles and route optimisation, increasing the percentage of use of rail systems.

[41] Cut-off percentage: 60 % of median equivalised income after social transfers

- Development of intermodality and the integration of different modes of transport, facilitating the connection between public transport, active mobility and other modes of transport, by creating infrastructure andservices enabling smooth and comfortable transit between them.
- Boosting active mobility through the use of non-motorised modes of transport, with the creation of dedicated lanes, the implementation of bicycle rental programmes, the design of safe and attractive pedestrian infrastructure, and awareness of the benefits of active mobility.
- Awareness raising and education to promote a shift in attitudes and behaviours towards more sustainable mobility, reporting on the negative impacts of excessive use of the combustion vehicle, the benefits ofsustainable movi and available alternatives.

And as one of the cross-cutting elements of transport and mobility policies, the integration of the specific needs of rural, remote, low population density, island areas, etc., plus gender issues and transport and mobility poverty, with support for vulnerable users.

2.2.4. Long-term Building Renovation Strategy

The climate and energy performance of buildings has evolved significantly, both in residential and tertiary terms, and has now become a real energy *hub*, both in the generation of renewable energy sources and in demand management, allowing for a considerable improvement in the reduction in final energyconsumption, while maintaining the necessary thermal comfort in the habitability of buildings.

This development has resulted in regulation at European level, which in turn has led to the publication ofthree long-term GIAS strands for energy renovation in the building sector in Spain. Thus, in accordance withArticle 4 of Directive 2012/27/EU on Energy Efficiency, the 'Long-term strategy for energy renovation in the building sector in Spain' was published in 2014. ERESSE', and in 2017 the 'Updating the Long-term Strategy for Energy Renovation in the Building Sector in Spain'. With the necessary amendment madeby Directive 2018/844 to Directive 2012/27/EU and Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, the obligation for each Member State to draw up a long-term strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050 became covered byArticle 2a of Directive 2010/31/EU. Drawing up the 'Long-term strategy for energy renovation in the building sector in Spain'. ERESEE 2020'[42] was a result of both the aforementioned Directiveand the fulfilment of Strategic Objectives 2, 3, 4 and 8 of the Spanish Urban Agenda[43], and is also one of the planning actions set out in its own Action Plan[44].

The 2050targets for the decarbonisation of the building stock as set out in the 2020 ERESEE are taken over by this NECP. The further detail concerning milestones, indicators and intermediate targets for 2030 and 2040 is provided in the ERESEE 2020.

42ERESEE 2020. 2020 update of the Long-Term Strategy for Energy Renovation in the Building Sector in Spain
Spanish Urban**43** Agenda 2019
44GENERAL ADMINISTRATION ACTION PLAN. Ministry for Public Works

Directive 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, which recasts and replaces the above-mentioned texts, provides in its Article 3 that each Member State shall establish a National Building Renovation Plan to ensure the renovation of its national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, with the aim of transforming existing buildings into zero-emission buildings.

This Plan, the content and periodicity of which are set out in Article 3 and Annex II, shall be submitted for the first time by 31 December 2026 and shall replace the current ERESEE, and shall contain, inter alia, a roadmap with nationally set targets and measurable progress indicators to achieve a highly energy efficient and decarbonised national building stock, updating the ambition levels contained in the previous strategies and plans. .

For its part, the objectives for the energy renovation of buildings up to 2030 are summarised in this Plan in the measures '2.8. Energy efficiency in existing buildings in the residential sector', '2.10. District heating and cooling networks in the residential sector' and '2.11. Energy efficiency in buildings in the tertiary sector', detailed in section 3.2.1 of this Plan, in Chapter 3 (Policies and measures).

The building stock shall be zero-emission by 2050.

Objectives in the field of energy renovation of buildings

Setting minimum energy performance standards for both residential and tertiary buildings.

2.2.5. Energy efficiency target in public buildings

Article 6 of the Energy Efficiency Directive (EED) requires Member States to draw up, publish and keep up to date an inventory of buildings in heated and/or cooled buildings owned or occupied by public bodies and with a total useful floor area of more than 250^{m} 2. Based on that inventory, Member States shall annually renovate at least 3 % of the total floor area to be transformed into at least nearly zero-energy buildings or zero-emission buildings.

This inventory shall be drawn up at national level on the basis of the existing inventory of heated buildings or buildings with coolingissues owned by the General State Administration, and the mechanisms and procedures forcooperation with the Autonomous Communities and local authorities for reporting their building heritage will be45 establishedand then integrated into a single inventory and the determination of the m^2 to be renewed annually by each administration.

Article 5 of Directive 2012/27/EU on Energy Efficiency established the obligation to renovate at least 3 % per year of the floor area of heated and/or cooled buildings owned by the General State Administration, in order to achieve the minimum energy performance requirements set out in Article 4 of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. The aggregate energy renovation target between 2014 and 2 022 has been 2 561 605 m² and the renovated area has been 2 575 462 m², representing a level of 101 % of the renovation target set for that period.

45 ENERGY INVENTORY OF GENERAL GOVERNMENT BUILDINGS. Transposition of Article 5 of Directive 2012/27/EU

To ensure the level of ambition consistent with a decarbonised model in 2050, this Plan assesses and promotes the savings that could be achieved from the 300.000 m^2per year renovation in the General State Administration and also shifts the 3 % annual renovation target to the other territorial administrations.

Moreover, Article 5 of the new EED establishes an obligation for the entire public sector to achieve, overall, a reduction in energy consumption of 1.9 % per year by 2030, based on the 2021 baseline, with the possibility to exclude public transport or armed forces. There will be a gradual introduction of this obligation in municipalities with less than 50.000 inhabitants and then in municipalities with less than 5.000 inhabitants.

As in the case of the inventory of buildings owned or in use by public sector entities, the procedures for collaboration with the various public sector entities to report their energy consumption are still to be specified, with a view to subsequently establishing the calculation baseline and the corresponding reduction targets.

Inaddition, Article 7 of the new Energy Efficiency in Buildings Directive provides that, as of 1 January 2028, new buildings owned by public bodies shall be zero-emission buildings (ZEB). Conscious of the new ambition, the Transformation, Recovery and Resilience Plan has devoted part of the funds to the integralrepossession of buildings of both the AGE and the Autonomous Communities and local authorities.

Efficiency objectives institutions' energy of the public sector	**Energy renovation of the stock of public buildings of the General State Administration, Autonomous Communities and local authorities of 3 % derived from Article 6 of Directive (EU) 2023/1791 on Energy Efficiency.** **Annual reduction in energy consumption of 1.9 % compared to 2021.**

2.2.6. Assessment of renewables potential in cooling and heating

As part of the instruments aimed at improving energy efficiency and gradually replacing fossil fuels with renewable energy, Article 14 (Promotion of efficiency in heating and cooling) ofthe Energy Efficiency Directive requires Member States to carry out a thorough assessment of their energyefficiency and renewable energy potentials in the heating and cooling sector. The assessment is carried out through a Cos-Benefit Analysis covering its territory based on climatic conditions, economic viability and technical suitability. This analysis should facilitate the identification of the most resource and cost-efficient solutions to meet heating and cooling needs. This study should serve as a basis for proposing policies to materialise the identified potentials. The deadline for submitting evaluations was 31 December 2020.

Delegated Regulation 2019/826 amended Annex VIII to Directive 2012/27/EU on efficiency potential in heating and cooling. According to this regulation, the full assessment of national heating and cooling potentials should include the following parts:

- Overview of heating and cooling
- Objectives, strategies and policy measures
- Analysing economic potential for efficiency in heating and cooling
- Potential new strategies and policy measures

In Spain, IDAE, as technical assistance to the Secretary of State for Energy of MITECO, has coordinated and carried out the study of the full evaluation of the potential of cogeneration and efficient networks in Spain46. The aim of the study was to analyse the technical and economic feasibility at national level of high-efficiency cogeneration systems and efficient district heating and cooling networks. The "Second comprehensive assessment of the potential for efficient heating and cooling" includes the necessary updates to comply with the above mentioned directive and regulation.

46 Efficient heating and cooling potential

The European Commission, when assessing the reports submitted by the Member States to comply with Article 14 EED, assesses the following aspects:

- Description of heating and cooling demand
- Forecast of heating and cooling demand
- Thermal map of the national territory
- The case of renewable energy sources
- The case of waste heat
- Analysis of costs and benefits
- Development of strategies, policies and measures that can be taken up to 2030
- Information on the share of high-efficiency cogeneration and the identified potential and progress achieved under Directive 2004/8/EC
- Estimation of primary energy savings
- Estimate of public measures to support heating and cooling

In the draft 'Report on the evaluation of national notifications related to Article 14 of the Energy EfficiencyDirective' drawn up by the Joint Research Centre for the European Commission, the report submitted by Spain is assessed with positive results, since most of the points mentioned above include all the necessary aspects. Points for improvement include: the inclusion of heating and cooling networks in the heat map, of cooling networks in the analysis of economic potential, the analysis of waste heat in industry and services, the consideration of long-term prices in the cost-benefit analysis and the reflection of budgets for public support measures.

Finally, Article 25 of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 states that,as part of the assessments discussed above and as part of its integrated national energy and climate plan and updates pursuant to Regulation (EU) 2018/1999, each Member State shall submit to the Commission a comprehensive heating and cooling assessment. That comprehensive assessment shall contain the information set out in Annex X to the Directive and shall be accompanied by the assessment carried out in accordance with Article 23(1) (b) of Directive (EU) 2018/2001 as amended by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023.

2.3. Dimension energy security

The NECP 2023-2030 endorses the security objectives set out in Spain's National Energy Security Strategy approved in 2015:

- Ensure diversification of the national energy mix by providing adequate representation of sources energy.
- Ensure security of supply in order to ensure access to the necessary resources at all times.
- Encourage the use of indigenous sources in order to diversify the energy mix.

In the current context of the green transition, and in accordance with the new regulatory framework approved both at national level (Law 7/2021 of 20 May on climate change and energy transition) and in the EU (Fit for 55 package) to guide the objective of climate neutrality in 2050, energy policy makes a significant contribution to achieving climate change objectives. This is why the 2015 National Energy Security Strategy is in the process of being revised and updated, taking into account the Energy Security + Plan adopted in October 2022, with a cross-cutting approach that integrates energy security and climate security, highlighting the immutabilityof climate change mitigation and adaptation and with content adapted to the new inter-national commitments(both by the COP and the EU).

In accordance with the new National Security Strategy approved in December 2021 (Royal Decree 1150/2021 of 28 December), a new Energy and Climate Security Strategy will be approved, with an innovative approach thatrespects the previous Energy Security Strategies as it will address security in the Energy and Climate Framework. This new approach will take into account the geopolitical,

technological, economic and social dimension of the energytransformation process and its contents will be built around three main axes: accelerating the energy transition, protecting the energy and industrial supply chain and fighting climate change.

Furthermore, in view of the changes *in* the energy production and consumption mix brought about by this Plan, providing secure, clean and efficient energy to the various consumer sectors entails significant challenges that need to be addressed at different levels:

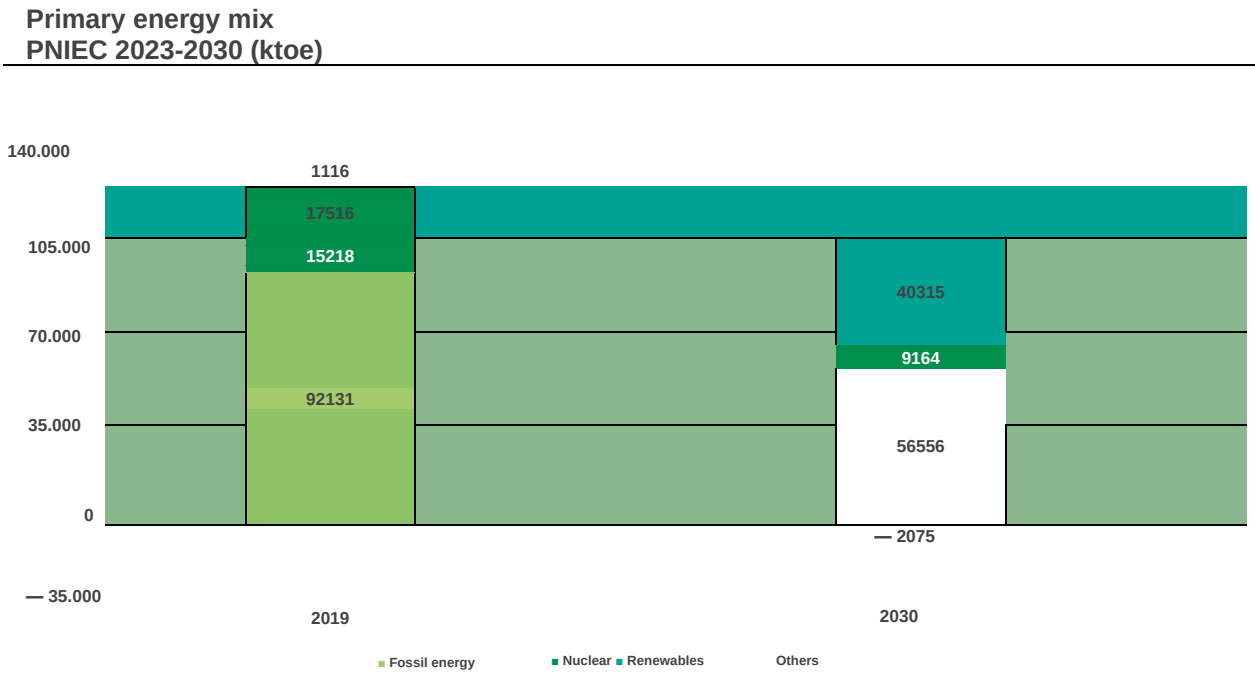
- Reducing external energy dependency, in particular the import of fossil fuels
- Diversification of energy sources and supply
- Preparedness to cope with potential constraints or disruptions of supply of energy sources
- Increasing the flexibility of the national energy system
- Boosting the development of new energy sources

Reducing external energy dependency

With regard to this first aspect, in 2019 Spain had an energy dependency ratio of 73 %, due to the predominance of fossil fuels in the energy mix (coal, oil and gas), as our country does not have appreciable volumes of domestic production of these fuels.

This dependence on primary energy has significant economic implications. Thus, in 2019, the balance of externalenergy savings was unfavourable to our country, amounting to more than EUR 26.000 billion. In thatcontext, this Plan reduces the energy dependency ratio by reducing the import of fossil fuels, in particular coal and oil.

Figure 2.7. Primary energy mix in Spain in 2019 and 2030 (ktoe)



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Table 2.9. Evolution of the primary energy dependency ratio (ktoe)

Years	2015	2019	2020	2025 *	2030 *
Indigenous production	34.118	33.823	34.458	43.762	51.588
	21 %	27 %	31 %	39 %	50 %
Coal	1.246	0	0	0	0
Petroleum Products	234	40	28	147	148
Natural gas	54	116	42	49	49
Nuclear	14.903	15.218	15.174	14.653	9.164
Renewables	17.267	17.922	18.674	28.539	41.805
Non-renewable waste	414	526	540	373	422
Net imported/exported	96.283	92.159	76.372	68.630	52.373
	79 %	73 %	69 %	61 %	50 %
Coal	12.337	5.072	3.100	1.470	952
Petroleum Products	59.727	56.122	45.661	47.662	37.468
Natural gas	24.489	30.781	27.874	21.035	17.940
Electricity	— 11	590	282	— 978	— 2.497
Renewables	— 259	— 406	— 545	— 559	— 1.489
Total Primary Energy	**122.506**	**125.981**	**110.830**	**112.392**	**103.962**

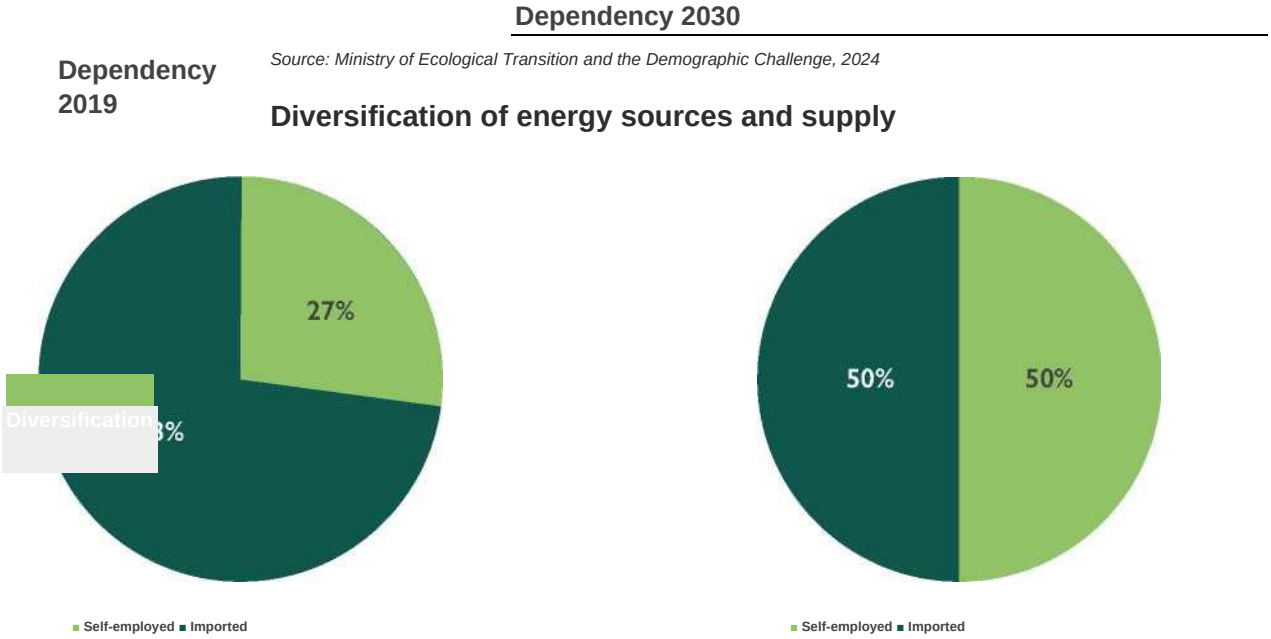
** Data for 2025 and 2030 are estimates in the 2023-2030 PNIEC Scenario.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Energy dependence

As a result of the measures envisaged in the NECP, 2021-2030, Spain's energy dependency ratio decreased by 23 percentage points, from around 73 % in 2019 to 50 % in 2030.

Figure 2.8. Energy dependency in Spain in 2019 and 2030



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The fundamental objective of diversifying energy and supply sources is to shape abalanced primary energy mix in which technically and economically viable sources are present by 2030, so as to ensure continuity of supply and achieve the decarbonisation objectives set out in this Plan. In addition, their geographical origin should continue to be diversified in order to minimise any risks of supply disruption.

Maximise diversification of both energy sources and source countries of supply.

With regard to the security of electricity supply in relation to the exit of coal in electricity generation by 2030 as a result of the market mechanisms (price of the tonne of CO2 on the EU ETS market), as well as the orderly and phased withdrawal of part of the nuclear park by that date (four of the seven existing reactors will cease to operate), set out in the Objective Scenario of this Plan:

First, this power withdrawal is offset by the significant penetration of renewable electricity generation technologies, in particular solar and wind power (**see Table 2.5). Evolution of gross installed electrical power (MW).**

Second, Spain has a fleet of 26.612 MW of combined cycle gas plants, which provides

a not-for-purpose back-up capacity to move towards this transition in the electricity mix over the decade 2021-2030. In addition, large-scale development of storage and demand-side management is envisaged. These new sources of flexibility will be crucial to replace the decommissioned phase of thermal generation sources, convincethem that currently provide the flexibility and firmness required by the electricity system at times of reduced renewable production. Other elements, such as interconnections, will also contribute to the necessary security ofSumi Nistro (in addition to fostering the integration of wholesale electricity markets).

Finally, the aforementioned reports/models have thoroughly and thoroughly analysed the safety of light electricityand concluded that there are full guarantees of supply in the Objective Scenario referred to in this Plan.

Preparedness to cope with possible supply constraints or disruptions

In the third of the plans, work will continue on preparedness to address potential constraints or interrups inthe supply of energy sources, in order to make the national energy system more resilient.

The current geopolitical context has put at risk the supply of natural gas to the European Union in volumes that are efficient inmaintaining our well-being. In the case of Spain, the efforts made in recent decades to increase the diversity of natural gas supply sources, the recent deployment of drinking reindeer gas generation,such as biogas and biomethane, and the development of new energy carriers such as renewable hydrogen have put us in a better position than other Member States.

The Spanish gas system, so far very little interconnected (known as the so-called ‘energy island’) with European systems, has invested heavily in order to diversify routes and means of transport to receive natural gas, in the form of LNG, by sea, which has been an additional effort on the part of Spanishgas consumers in terms of purchasing power. Between 1969 and 2012, 7 regasifi cation plants-(currently all operational) were built, as well as other infrastructure such as pipelines and underground storages.

This allows us to conclude that, although security of supply in the gas sector is high, it is essential to further increase the resilience of the gas sector in order to be able to cope with any stress situation.

Resilience

Deepen preparedness for potential constraints or disruptions of supply of energy sources.

With regard to electricity supply, Spain, due, among other things, to the low level of energy interconnections with the rest **of the European continent, has a robust preparedness system to autonomously cope with energy supply constraints or disruptions**, as well as preparedness plans for specific risks in the electricity sector.

Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC calls on Member States to draw up a risk-preparedness plan for the electricity system as a whole. This preTende plan is a document covering all contingency elements that the electricity system as a whole may face.

Following Russia’s invasion of Ukraine, these documents have become more relevant and expanded their ENFO,which should include, inter alia, the impacts that shortages of certain raw materials (e.g. reduction

of natural gas supplies to Europe) may have on the electricity system. This document ispending approval at national level.

It should also be borne in mind, in that regard, that electricity and gas system operators are primarilyresponsible for ensuring continuity and security of supply and proper management of the various networks, carrying out their tasks in coordination with all the actors involved.

Security of electricity supply is at the heart of the security of electricity supply. In Annex D Supplies guarantee: Aprobative analysis of the coverage of the Objective 2030 scenario is presented in detail by the EER. Similarly, Annex B sets out the models specific to the electricity sector used. The main task of the analyses carried out by both models was precisely to validate that the security of the electricity supply of the generation mix presented is guaranteed under the most demanding conditions.

In the field of natural gas, the progressive penetration of renewable gases requires adequate preparation of the networks and other infrastructure to ensure that the progressive decarbonisation of the gas sector is feasible. In the case of biomethane, for example, demand and supply patterns will vary for the time being to inject gas into distribution networks, which have typically been used to feed consumers.

Finally, it is important to anticipate also other potential future threats, such as those arising from excessivetechnological hardship. In this regard, Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's Net-Zero Technology Manufacturing Ecosystem (NZIA) promotes the reductionof energy from outside the EU in technologies critical for the development of the energy transition by, inter alia, including criteria other than price in electricity auctions and support lines.

Flexibility and demand

The objectives for the three energy security plans that have been put forward respondto needs from the energy supply side.

However, it is also necessary to take advantage of the new possibilities offered by technologiesto make the energy system more viable, not only on the supply side but also on the **demand side.**

Flexibility **Increase the flexibility of the system by exploiting the demand-side possibilities of the energy-consuming sectors.**

Promoting demand-side flexibility will unequivocally play an indispensable role in guaranteeing its electricity minister, especially in an environmentof increasing integration of renewables and reducing the thermal gap.

This encouragement of demand participation should be articulated from a broad perspective, which must necessarilyencompass greater demand participation in all market segments, from day-ahead markets to balancing services, managed by the system operator, as well as the creation of new business models that enable demand participation and the exploitation of its managemability potential (e.g.: through the creation, deployment and implementation of energy communities or the independent aggregator).

Boosting the development of new sources of energy supply

The management of the gas system should play a very important rolehere in view of the progressive disconnection of many consumers who have made the decision to introduce renewable hydrogen into their production system. In many cases, this change of energy product will be progressive (mostly) and in others it will be much more ambitious.

New vectors **Adapt existing infrastructure to the new configuration of energy demand.**

2.4. Dimension internal energy market

The objectives corresponding to the Internal Energy Market dimension of the Plan address the need for a more competitive, transparent, flexible and non-discriminatory market with a high degree of interconnection that promotes cross-border trade and contributes to energy security.

At the same time, this market must be focused on consumers and their protection, setting theconditions necessary to ensure a just transition and address situations of energy poverty.

These objectives are addressed from the following levels (within each one the electricity and gas markets are specifically addressed):

- Interconnectivity
- Energy transmission infrastructure
- Integration of the internal energy market
- Implementation of the National Strategy against Energy Poverty

With regard to electricity market interconnectivity, interconnections not only improve the efficiency of systems by contributing to a more efficient allocation of generation installations by reducing the need for double-sided installations acrossborders, but are essential for security of supply, especially in a contextof high penetration of electricity generation from non-dispatchable renewable sources.

They are also the essential element in achieving an internal electricity market with competitive prices and mogenic prices, since they make it possible to increase supply (through imports) in those markets where, at a certain point in time and depending on prevailing climatic, technical and economic conditions, the price is latelyhigher, thus moderating prices and bringing them closer to those prevailing in the export markets at that time.

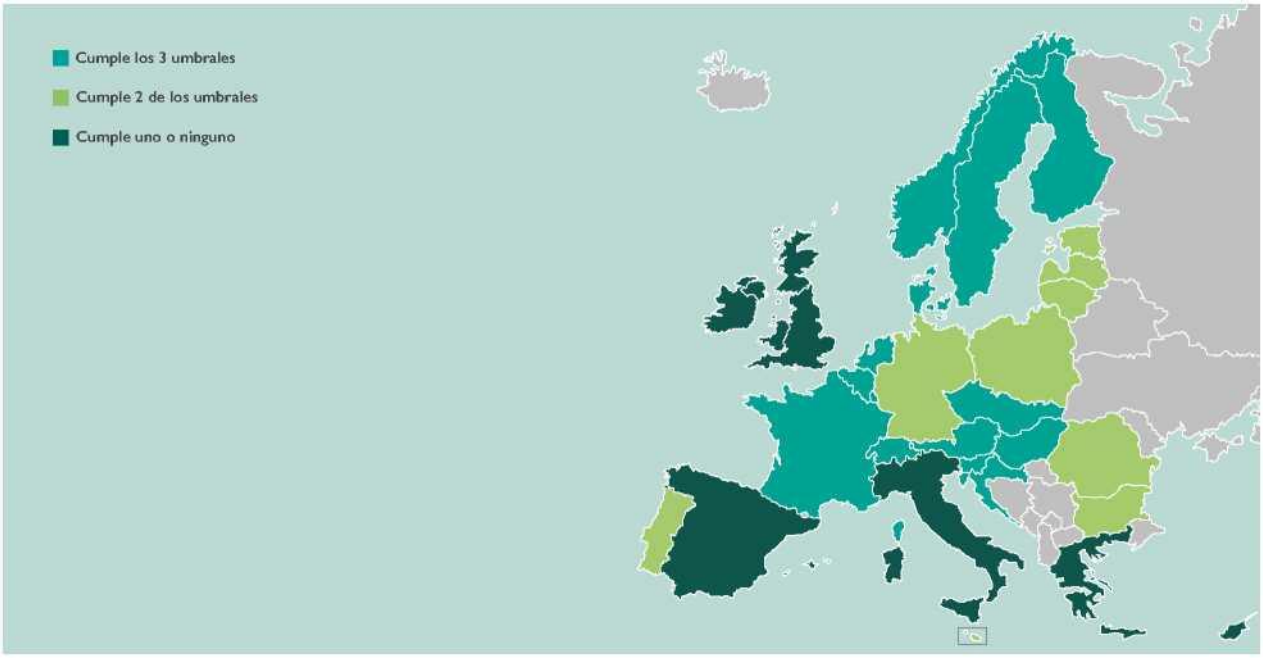
- The economic benefits of an adequate degree of electricity interconnection include:
- Savings in investments to strengthen the transmission and distribution network.
- Lower costs of guaranteeing immediate services by effectively moving balancingenergy.
- Lower spills of renewable energy (loss of income for producers due to the energy generated that is not consumed, nor can it be exported).
- Lower cost of hedging risks compared to higher market price volatility.

In this regard, the level of interconnection of the Iberian electricity system with the rest of the European continent falls short of the objectives laid down by Community legislation. Currently, Spain's interconnection ratio is less than 5 % of the generation capacity installed in our system. Moreover, considering that real support for the Iberian Peninsula can come only from the Central European system across the border with France, the inter-connection ratiois 2.8 % (after the last interconnection between Spain and France for the Eastern Pyrenees put into service in 2015). In other words, the Peninsula remains largely an 'electricity island'.

Nor is it met with additional and more specific thresholds that serve as indicators for the urgency of the necessary action, set out in the Commission Communication on Strengthening Europe's Energy Networks (COM (2017) 718) (see Figure 2.9), and recalled in Regulation 2018/1999 on the Governance of the Energy Union and Climate Action. These thresholds are:

- Spread of annual average prices above EUR 2/MWh
- Ratio of nominal transmission capacity to peak demand of less than 30 %
- Ratio of nominal transmission capacity to renewable capacity below 30 %

Figure 2.9. State of play of the three thresholds set out in COM (2017) 718[17]



Source: Ministry of Ecological Transition and the Demographic Challenge, 2019

[17] The thresholds are: (1) additional interconnections should be a priority if the price differential exceeds an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones, (2) countries where the nominal transmission capacity of interconnectors is less than 30 % of their maximum load should immediately examine possibilities for new interconnectors, (3) countries where the nominal transmission capacity of interconnectors is less than 30 % of their installed capacity of production of energy from renewable sources should immediately examine possibilities for new interconnectors.

Ultimately, in 2020 and with the planned interconnections, Spain was the only country in continental Europe below 10 % (target set by the Barcelona European Council in 2002). Subsequently, Regulation 2018/1999 on the Governance of the Energy Union and Climate Action has raised that target to 15 % by 2030.

Electricity interconnection	**Reach an interconnection level of 15 % by 2030.**

Apart from the measures proposed in Chapter 3, it is worth recalling the role of indicative planning, which isa basic focus on ensuring security of supply, increasing penetration of renewables and reducing technical constraints on the grids. Among its main objectives is to increase the level of interconnections.

In the electricity system, the integration of a significant volume of renewable generation power, both in the mainland and in non-mainland territories, makes it necessary to strengthen and grow transmission and distribution lines on Spanish territory, including the connections between the mainland and non-mainland systems and interlinkagesbetween island systems. Similarly, there is a need to develop mechanisms for the management and storage of non-dispatchable renewable energy sources, enabling the landfill of renewable generation to be reduced.

In the particular case of island territories, the increase in interconnections within their electricity systems will havea direct impact, since there is a greater contribution to the production mix of these systems from coal, fuel and/or gasoil plants than in the mainland mix.

Finally, it is important to highlight the role played by the **specific control centre of the Operador del Sistemaeléc trico (Red Eléctrica de España)**, which optimises the proper integration of renewable energies, making it possible to monitor them in the light of the possible variability of forecasts and their integration into balancing services.

This objective should be achieved through electrical energy storage, optimisation of the use of thedraulic hi resource and consumer information, maintaining its current production capacity and significantly increasing hydraulic energy storage.

	Integration of renewables and reinforcement in non-peninsular territories.
Infrastructure for electric transport	
Market integration	**Optimising the functioning of the market.**

electric

As regards the gas market, the focus is also on securing and developing the market, while protecting the consumer. In this market, it is considered a priority to optimise the use of existing interconnection capacity to facilitate access to other gas sources and move towards price convergence, prior to new infrastructure. In this respect, Spain has been a clearly importing country for its natural gas interconnections. However, following the outbreak of the conflict in the war in Ukraine, the situation has reversed, and on many days in 2022 and 2023, the peak of Spain-France lead export capacity has been reached, which has prompted, among other measures, the reductionof the capacity available for contracting on the Irún interconnection by 66 %, increasing from 60 GWh to 100 GWh per day. This meant at the end of 2022 a 18 % increase in total capacity from Spain to France through the two existing interconnections, Irún and Larrau, with a maximum total capacity of around 8,5 bcm per year:

- Gross exports to France via pipeline reached the record record of 35.4 TWh in 2022
- The net balance of entries and outflows with France also turned out for the first time for the first time (13.83 TWh)
- For Portugal, the net export balance was 1.2 TWh.

With regard to the integration of gas markets, it has been noted last winter that this lack of port interconnectionhas led to a clear lack of choice between markets where LNG imports were available (with greater energy security) and markets that were dependent on supply via pipelines from third countries. In 2022, the relevant European market (TTF) ranked prices above EUR 180/MWh for several weeks between July and September, compared to an average of EUR 40/MWh in 2021. The peak was reached on 26 August at EUR 320/MWh.

The maximum reference price in Spain (MIBGAS) was lower than the European reference price with spreads of EUR 30/MWh. The maximum was EUR 240/MWh. The easing of these prices has been partly favoured by favourable weather conditionsin Europe, but also by the adoption by the Council of the temporary mechanism to limit natural gas prices. In doing so, the Regulation helped to limit episodes of excessive gas prices in the EU that do not reflect world market prices, while ensuring security of energy supply and stability of financial markets.

Among the measures planned to optimise the use of interconnections, the European Commission, by Regulation (EU) 2017/460, laid down the principles to be followed in calculating transmission tariffs in order to standardise themethods used by the Member States. However, it can be seen that there is ample room for improvement. ACER therefore analyses the use of interconnection between France and Spain in *its Market Monitoring* Report 2017, concluding that 'it is important that tolls at the Pyrenees Virtual Interconnection Point (VIP) are among the highest in the EU. This is seen as discouraging spot trade." Specifically, the exit toll from the French gas system to the Spanish gas system in that year was 2,5 times higher than the exit tolls for the Spanish gas system. Although the report for 2021 shows some improvement, as the cost of transport from France to Spain (EUR 1,86/MWh) is 2 times higher than that for Spain to France (EUR 0,92/MWh), it is considered necessary to continue working at European level on the uniformity of the procedure for calculating transport tolls.

Gas transport infrastructure: Tolls and charges

Considering the maturity of the infrastructure of the gas system, the main objective is to maintain the economic surplus path of the system in the medium and long term. In this regard, in 2020 the CNMC approved the various Cir Modesthat will apply in the new regulatory period 2021-2026:

- Circular 1/2020 of 9 January 2007 laying down the remuneration methodology for the technical manager of the gas system.
- Circular 2/2020 of 9 January 2007 laying down balancing rules for natural gas.
- Circular 4/2020 of 31 March laying down the remuneration methodology for the regulated activity of naturalgas taxation for the period 2021-2026.
- Circular 6/2020 of 22 July 2015 of the National Commission on Markets and Competition, establishing the methodology for calculating transport charges, local networks and the regasification of natural gas.
- Circular 8/2020 of 2 December establishing the unit reference values for investment andration and maintenance for the regulatory period.

Theenergy policy guidelines previously adopted by MITECO in Order TEC/406/2019 of 5 April laying down energy policy guidelines for the National Commission on Markets and Competition underline that these circulars should 'ensure the economic and financial sustainability of the gas system', which has been shown to be positive for the evolution of the deficit within the sector, where, for example, in 2021, a surplus of EUR 81.1 million was reached, which was used to partially cushion the outstanding annual deficitof 2014, which is now almost fully depreciated.

Regulated cost structure of the electricity sector

The implementation of the new methodologies for tolls for the transmission and distribution of electricity (Circular 3/2020 of 15 January 2015 of the National Commission on Markets and Competition, establishing the methodology for calculating electricity transmission and distribution tolls) and for charging the electricity system (Royal Decree 148/2021 of 9 March 2007 laying down the methodology for calculating electricity system charges) has enabled the establishment of regulated priceschemes which, while complying with the principle of eco-nomicand financial sustainability of the electricity system, at the same time contribute to the objectives of decarbonisation and integration of renewables.

In the case of costs financed by the electricity system charges, a large part of the costs (especially those related to the payment of the so-called 'tariff deficit' and the costs associated with the specific remuneration regime) will be gradually reduced. In particular, the cost associated with the annual deficit is expected to come to an end in 2028, while for the costs of the specific remuneration scheme for renewables, cogene-ration and waste (RECORE), the duration and duration of these costs will be strongly influenced by various factors, with the price of electricity on wholesale markets being one of the main drivers of these markets.

Securing the market, ensuring the protection of gas consumers.

Market integration gas

This overall objective, in turn, translates into specific objectives of gas logistics, consumer information and streamlining administrative procedures.

In relation to the integration of the Spanish gas market with the European one among the main tools, the optionof using interconnections, improving their capacity to respond to the Emer Emergency situationcaused by the war in Ukraine, as well as the achievement of an Iberian organised gas market, through the future integration of Spanish and Portuguese PVB, are included.

Implementation of the National Strategy against Energy Poverty.

Protection of vulnerable consumers

The National Strategy against Energy Poverty (ENPE) adopted in 2019 is the instrument for tackling the phenomenon of energy poverty from a comprehensive, medium- and long-term perspective.

It is important to stress that the temporary period covered by the Strategy has been highly conditioned by unprecedented events in recent times, of high impact and unpredictable in the international context, such as the COVID-19 health emergency (2020-2021) and the energy price crisis following the invasion of Ukraine (2021-2022). These substantial changes in the international context have called for a response in the form of urgent and cyclical measures to address these exceptional situations, where protection of its viewersand securing supply have been the government's top priorities, prioritising in particular the protection of vulnerable consumers. These short-term measures, together with the first steps in more structural energy reforms contributing to the energy transition and consumer protection, have been part of the rollout of this Strategy and complemented it with actions that were not initially planned.

The main measures taken to protect the most vulnerable consumers since ENPE's publication have been the continuous strengthening of social vouchers and the establishment of a minimum vital supply, which is a pro tectionin the face of outages.

The Strategy provides a definition of energy poverty and, linked to it, that of vulnerableconsumers. It has made an initial diagnosis and characterised the problem through the design of officialindicators matching those used by the EU Energy Poverty Advisory Hub (EPAH), which will allow comparison with other Member States. The indicators are available on the basis of consolidated surveys prepared by the National Statistical Institute (Family Budget Survey andLife Survey) and published annually by MITECO. Key indicators are:

- Disproportionate expenditure: share of households whose energy expenditure in relation to their income is more than double the national average.
- Hidden Energy Poverty (HEP): percentage of households whose absolute energy expenditure is less than half of the national

average.

- Inability to maintain the house at an appropriate temperature.
- Late payment of invoices for supplies of the dwelling.

In addition, the analysis of these indicators is complemented by other indicators derived from the climate zone, as well as by variables that characterise the selected populations (size and type of household, income quintile of the consumption unit, activity status of the members of the household, etc.).

The IDAE, a public company affiliated to MITECO through the State Secretariat for Energy, has been designated as the body responsible for monitoring the Strategy.

In addition, in the area of regulatory production, one has been approved in the last two yearstogether with legislative provisions that have sought to strengthen schemes to support and protect groups in situations of energy vulnerability. Aspects such as the relaxation of income thresholds, the use of the unit of living together to replace the family unit, or the automatic renewal of the social voucher, in addition to the creation of thenominated minimum vital supply, are just some of the examples of this intense regulatory output that has succeeded in protecting the most vulnerable groups at a time of particular sensitivity as a result of the energy crisis.

2.5. Dimension research, innovation and competitiveness

2.5.1. National R & D & I targets and national funding targets

(A) National R & D & I targets

National targets in R & D + I

- **Addressing the priorities of our environment by putting** science, technology and innovation as key axes in achieving the Sustainable Development Goals of the 2030 Agenda, contributing to the EU's policy priorities by aligning with its R & D & I programmes and prioritising the challenges of national strategic sectors through RDI, for the benefit of our country's social, economic, industrial and environmental development.
- **Promoting R & D & I and its transfer by**:

1) Generating knowledge and scientific leadership, optimising the position of research staff and institutions, as well as the quality of their infrastructure and equipment.
2) Promoting quality and scientific excellence, favouring a systemic effect that reaches and benefits more groups.
3) Applying scientific knowledge to the development of new technologies that can be used by businesses and strengthening the capacity to communicate with our society and to influence the public and private sector.

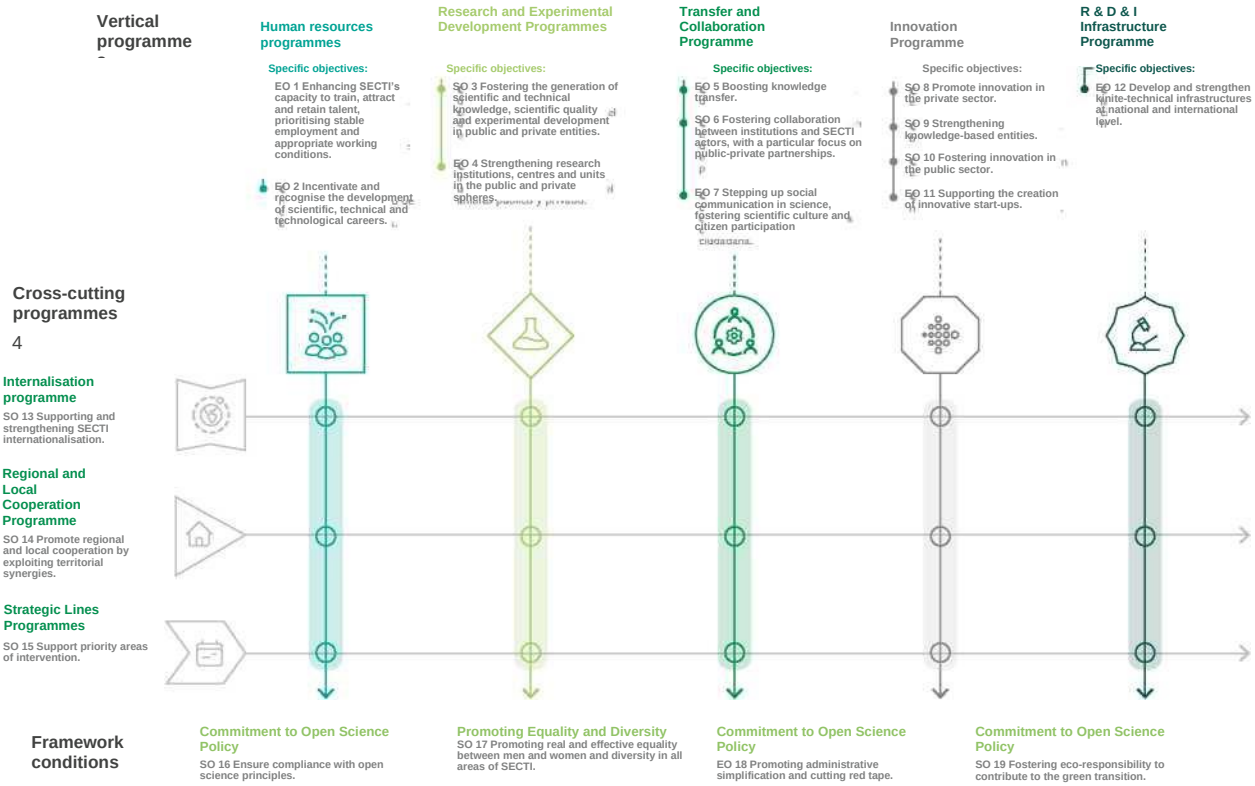
- **Develop, attract and retain talent**, facilitating career progress and mobility of research staff in the public and private sector, and their ability to influence decision-making.
- **Catalyse innovation and business leadership,** fostering knowledge transfer and developing two-way links between science and business, through mutual understanding of needs and objectives, especially for SMEs, increasing the business fabric's commitment to R & D & I and broadening the perimeter of innovative companies to make the business fabric more competitive.

To reinforce these objectives set by the Spanish Strategy for Science, Technology and Innovation (EECTI) 2021-2027, the **Plan for Attracting and Retention of Scientific and Innovative Talent to** Spain was approved in June 2022[47]. Similarly, in compliance with the OECD Roadmap for Improving Knowledge Transfer in Spain, a Knowledge Transfer **and Collaboration Plan** was drawn up[48], published in December 2022, with the aim of strengthening links between the public and private sectors in R & D & I, in order to increase the socio-economic impact of public investment in research and boost the innovative capacity of Spanish companies.

The objectives set out in EECTI 2021-2027 are implemented at State level through the State Plan for Scientific and Technical Research and Innovation (PEICTI). In particular, the 2024-2027 PEICTI defines 19 specific objectives with a matrix view (see graph) where 12 objectives are addressed through vertical programmes and 7 are deliveredthrough cross-cutting programmes and framework conditions, which operate across the whole of the EICTI. One of the cross-cutting programmes is **the Strategic Lines Programme** aimed at supportingpriority inter action areas including the energy transition. In addition, **framework conditions** are defined, which are present and have an impact on all programmes, both vertical and cross-cutting, and compliance with these conditions needs to be verified in all actions. The framework conditions include eco-responsibility, aimed at contributing with the green transition, and promoting equality and diversity.

47Scientific and Innovative Talent Attraction Plan (sciena.gob.es)
48Transfer and Collaboration Plan (Ciencia.gob.es)

Figure 2.10. Vertical and transversal programmes of the EIPTI 2024-2027



MATRIX OF OBJECTIVE PROGRAMMES OE: Strategic objective

The objectives set by EECTI and the PEICTI call for a cross-cutting approach, since it is fromthe priorities that R & D & I policy itself and sectoral areas of public policy need to be tackled, where the development, use and implementation of scientific, technological and innovative knowledge should be encouraged.

Furthermore, the objectives of decarbonising the economy and combating and adapting to climate change require technical and economic improvements and new solutions for which research, technological development and innovation are key pillars. Governments, as promoters and funders of science, development and innovation, have a key role in defining strategic priorities, promoting targeted research and development and facilitating the introduction and adoption of new environmentally friendly technologies.

From this perspective, the commitment of science and innovation in Spain to environmental protection and sustainability has been strong, with the perspective of sustainable development included in previous State Research, Development and Innovation Strategies and Plans.

In the 2024-2027 PEICTI, the strategic lines and their priority areas of intervention have been updated through a participatory process involving the various actors of SECTI and taking into account the PERTE and a series of sectoral strategies and plans aimed partly or entirely at promoting research and innovation activities intheir respective areas of competence. In particular, in the **energy and mobility** framework, the following strategic lines and their respective priority areas of intervention have been identified:

- **Energy transition and decarbonisation**: Renewable energy for thermal and electrical use and storage; Fusion energy; Nuclear safety and waste management; Technologies for the production, distribution and use of newenergy VECTO; Advanced biofuels, synthetic fuels and renewable hydrogen; Carbon capture, storage and use and its recovery; Smart grids for advanced renewable energy management; Sustainability of energy technologies; Energy efficiency.

- **Smart and sustainable**mobility: Electric and connected vehicle; Aeronautical and naval technologies; Aeronautical and naval-systems and in phrases; Smart and advanced manufacturing; Smart and sustainableroad and rail, aviation and maritime transport systems and infrastructures; Transport safety, advanced monitoring and early warning systems.

- **Smart and sustainable cities and ecosystems**: Urban planning, architecture and engineering; Sustainability-nable construction; Energy efficiency in buildings and urban environment; Urbanism, infrastructure and ecological ecosystems.

- **Just and inclusive energy transition**: Territorial development and sustainability and green transition.

PECTI also identifies priority areas of intervention related to **environment, climate and air quality**, **biodiversity** and **natural resources and environments**. In addition, **industrial transition** is established as a strategic line, including **industrial decarbonisation and energy efficiency**, the **circular economy**, **eco-innovation** and **raw materials** as priority areas of intervention.

It should be borne in mind that the defined national strategic lines should be reinforced by co-working activities that break classical boundaries between disciplines. Thematic prioritisation enables the development of basic research lines and fosters interdisciplinarity that generates high impact science and knowledge. Multidisciplinary measures are also encouraged, which will allow scientific missions to be carried out and projects to be targeted on the SDGs. Interdisciplinary research requires fostering interlinkages between different disciplines, maintaining an appropriate balance between them, while preserving the conduct of unidisciplinary science.

Theachievement of the objectives of research, development and innovation for energy and climate shall follow theguiding principles set out in EECTI 2021-2027 and the 2024-2027 EICTI, aimed at **the quality of R & D & I, coordination, coordination and cooperation**, **gender equality and equal opportunities**, gility **ofadministration and accountability**, **ethics and integrity of R & D & I and freedom of scientific research** and the **logical, social and economic responsibility of R & D & I**.

In relation to the latter, it should be noted that the transformation of the energy system and the economy towards a climate-neutral

country implies a change for which it is essential to **involve society** in a stable way. The aim is to mobilise existing social resources so that the transition optimises talent for innovation and the search for solutions and finds the necessary support to overcome the challenges ahead, as well as to motivate the significant behavioural changes that are needed and to involve society as a whole in the opportunities it brings. The energy transition to a model based on renewable energy makes it possible to put citizens at the heart of the energy system, offering themevery opportunity.

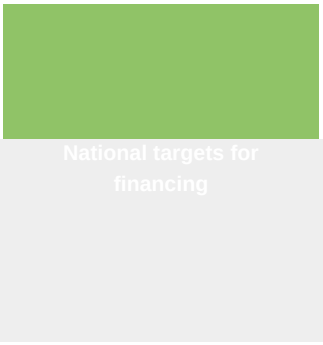
At the same time, the digital transformation is, together with the energy transition, one of the main challenges we face as a society. The deployment of digital technology is having an impact on the economy as a whole and, in particular, on the energy sector, affecting and transforming the definition of the current market model. In short, digitalisation will help put citizens at the heart of the energy transition. The use of newtechnologies will facilitate more autonomy in the way people use and manage energy. In this respect, wide-spectrum

technologies such as the Internet of Things, biotechnology, nanotechnology, artificial intelligence, blockchain, robotics and information and communication technologies are highlighted.

The digital transformation will enable the development of a data management industry, which is key for energy security. Faithfully, to incentivise a more active role on the part of consumers, figures such as independent aggregators can guide citizens in managing demand, self-consumption and improving energy efficiency.

This is without forgetting smart grid initiatives to anticipate solutions in the field ofnew censorship technologies, dynamic grid capabilities, monitoring of network elements, self-consumption, tric-carand new possibilities for consumers. A smarter energy system makes it possible to empower the consumer.

(B) National funding targets



Law 17/2022 amending Law 14/2011 of 1 June on Science, Technology and Innovation (LCTI) sets the objective for public R & D funding to increase regularly to reach 1.25 % of GDP in 2030, in line with Council Recommendation (EU) 2021/2122 of 26 November 2021 on a Pact for Research and Innovation in Europe. The European Commission has set a target for 2030 for Member States to invest in total 3 % of GDP in R & D between public and private.

Spain has been part of the ***Mission Innovation 2.0 Initiative since*** 8 September 2022. As part of this initiative, each member country has committed in this second phase to maintain, and whenever possible, increase investment in energy research, development and demonstrations.

Across the board, it should be taken into account that all actions, including those targeting R & D & I financed by structural funds and NextGenerationEU funds, must justify compliance with the DNSH principle to the environment.

Moreover, the European Green Deal recognises that new technologies, sustainable solutions and breakthrough innovation areessential elements to achieve its objectives. To keep its competitive advantage in clean technologies, the EU needs to increase significantly the large-scale deployment and demonstration of new technologies across sectors and across the single market, building new innovative value chains. Horizon Europe, in synergy with other EU programmes, will play a pivotal role in leveraging national public and private investments. At least 35 % of the budget of Horizon Europe will fund new solutions for climate, which are relevant for implementing the Green Deal.

2.5.2. Specific targets for low-carbon and clean energy technologies

The implementation of the priority objectives for R & I in energy and climate in Spain has been defined on the basis of theGlo Bales objectives of this Plan, those set out in the implementation of the SET-Plan and the consultation of public and private sector experts. The energy R & I targets fall into four areas:

- Development of clean energy sources (onshore and offshore wind, concentrated and non-concentrated solar photovoltaic and solar, bioenergy, ocean energy, biomass, geothermal, alternative renewable fuels) and measures to improve energy efficiency. As well as energy carriers such as hydrogen.
- Competitiveness to improve the efficiency of the Spanish and European energy network through the development of a highly digitalised internal energy system and market.

- Security of supply, to better coordinate domestic energy supply and demand in an international context.
- The social and technological drive towards lower energy consumption patterns.

Specifically, the following priority areas and technologies are defined in line with the SET-Plan, the internationalbuys acquired and the

particularities and opportunities of the Spanish economy, natural resources, industry andgeo graphics:

Energy efficiency

- **In the case of buildings** (Action 5 of the SET-Plan), improvements will be sought to facilitate deployments of:
  Active and passive solutions in the energy renovation of buildings
  — Renewable heating and cooling systems
  — Participation of renewable energy in district heating and cooling networks
  — Use of renewable energy in buildings
  — Renewable energy produced by cities, energy communities and self-consumers
  — Low-temperature heat pumps and solar thermal energy
  — Building energy consumption management systems

- **With regard to industry, priority** will be given to the implementation of energy competitiveness and innovation measures aimed at increasing process efficiency, waste heat recovery, the incorporation of renewableenergy and the integration of CO2 capture technologies to reduce emissions. Particular attention will be paidto techno-logies and applications for resource and energy-intensive industries (Action 6 of the SET-Plan). In addition, the Plan + SE sets out measures to support industry for energy saving and efficiency, including accompanying cogeneration and increasing aid for energy efficiency in the industrial sector.

Energy generation from renewable sourceswhere there is already a competitive or leading position, with high levels of participation of Spanish companies in the market, in line with the European target of global leadership in renewable energy[49] (Action 1 and 2, and Action 8 of the SET-Plan). This line of action identifies two priority objectives: increase the efficiency of different renewable energies and reduce the cost of these technologies. Concretely:

- **Photovoltaic energy**. Development of new materials and technologies; reduction of costs in the development, construction, operation and maintenance of large plants; integration of solar photovoltaic energy in buildings, and other infrastructure and sectors (electric vehicle, agro-PV, street furniture, floating photovoltaic, etc.); improvement of PV generation g- tionability and grid integration, advanced manufacturing of photovoltaic technologies.

- **Concentrated solar energy**. Technological solutions that reduce costs and integrate this technology into the energy system are highlighted, taking advantage of its ability to increase the inertia and manageability of sistema. Hybrid solutions also with other renewable technologies to give flexibility to the energy system and shift the use of natural gas as back-up. The promotion of medium temperature (90 °C – 400 °C) solar technologies for the production of heating and cooling in industry is also considered among the priorities. Looking ahead

  2050 the development and implementation of the next generation of thermal concentration solar technology will beencouraged to deepen the contribution of renewable stewardship and firmness to the system at competitive prices.

- **Biomass** Technological solutions to optimise the value chain, from obtaining the resource to its valorisation, seeking to reduce costs and improve the efficiency of facilities and processes. Biomass for theproduction of heat, electricity and renewable fuels.

- **Offshore wind**. Technical progress enabling the reduction of the costs of this technology, with an emphasis on floating solutions and non-invasive manufacturing, assembly, operation and maintenance techniques on the marine environment, which increase the

[49] The Renewable Energy Directive (EU) 2018/2001 entered into force in December 2018, as part of the Clean Energy for All Europeans package, which aims to keep the EU as a global leader in renewable energy and, more broadly, to help it meet its emissionreduction commitments under the Paris Agreement. The ambition and measures of the Directive have been revised several times in order to achieve the urgent emissions cuts (at least 55 % by 2030) needed to achieve the EU's increased climate ambitions. In July 2021, the Commission proposed a revision of the Directive (COM/2021/557 final) with a 40 % increase target as part of the package to deliver on the European Green Deal. In May 2022, the Commission proposed in its REPowerEU Communication (COM/2022/230 final) to further increase this target to 45 % by 2030.

potential areas of deployment of offshore wind farms and accelerate their contribution to decarbonisation objectives at competitive cost. Innovative solutions for on-shore power that leadto cost reductions and improvements in managemability will also be supported.

- **Deep and shallow geothermal**. In the case of somera geothermal, given its potential for decarbonisation in edifi cation, technical development will be sought to reduce implementation costs, improve landfouling methods, increase the productivity of surveys and integrate building renovation, among others. Deep geothermal requires support to improve efficiency and reduce costs.

- **Ocean Energy**. Developments in this technology, both current and wave, need impetus to increase the TRL until 7, 8 and 9. To this end, activities need to be focused on possible demonstration projects thatdeny knowledge and experience in a real marine environment. The long-term ocean energy strategy proposes the development and implementation of reliable generation parks at competitive prices.

Technologies that contribute to the flexibility and optimisation of the electricity system as a whole[50] taking intoaccount the objectives pursued: generation based on renewable primary resource (usually variable), support for system inertia and market potential via international interconnections (including major international lines). Particular attention will be paid to manageable renewable energies such as solar thermoelectric withearth storage, biomass and other storage options. Three areas are therefore included:

- **Generation**: R & I in other renewable technologies that contribute to managemability and are needed in the transition process.

- **Storage**: Thermal and electrical storage systems and optimising their management. The development of both mobility and stationary batteries will be particularly important in this area. Progress on bats will requirethe development of new advanced materials and technologies allowing for an alternative scenario to lithium. The collaboration of industry and academic research in the development of new generation battery manufacturing pilots is envisaged, also addressing the sustainability of batteries in terms of materials and raw materials and their reuse and recycling (Action 7 of the SET-Plan).

- **Electrical system**: Achieving a secure and resilient system in the context of the energy transitionwill require technological developments in digitalisation, power electronics, storage, equipment and materials upgrades, thus pointing to the consolidation of smart electricity grids, increased asset flexibility and renewables managemability (Action 4 of the SET-Plan).

Nuclear energy: The PNIEC provides for the scenario of the orderly and staggered cessation of operation of the nuclear parkbetween 2027 and 2035, but as long as Spain keeps its nuclear power plants operational, it is necessary to continue research into nuclear safety, radiation protection and waste management. Nuclear research and development will be carried out in collaboration with other EU nuclear countries, in the framework of the EURATOM Programme, in two specific areas:

- **Nuclear fission**, where priority research lines and technologies include: safe and long-term operation (Ac.10 of the SET-Plan), radiation protection, management of irradiated fuel and waste, non-energy applications of ionising radiation and participation and acquisition of know-how.

- **Nuclear fusion,** as a potential future source of energy for electricity production. Spain is advocating this technology bothin the experimental programme through ITER, Fusion for Energy and IFMIF-DONES, and in the analysis and simulation programmes.

Sustainable transport: implementation of new, less polluting, safer, better integrated and responsive solutions to societal demands and uses.

Renewable fuels for the transport sector. The development of these technologies is considered a priority because they apply to aviation,

[50] The **50** deployment of low-carbon technologies that provide flexibility to the system is essential to achieve high levels of penetration of intermittent (or fluent) renewables. Without this flexibility, despite offering low generation costs, such as PV, wind and others, they would have a lower penetration ceiling.

mobility, industry and buildings. (Action 8 of the SET-Plan).

- Development of sustainable or advanced biofuels.
- **Production of hydrogen of 100 % renewable origin** and its use as stationary storage for largequantities and long periods of time.
- Biomethane production

New services and technologies for consumers, smart cities and communities. (Action 3 of the SET-Plan).

- **Smart solutions for the energy consumer** that improve and value the citizen's position asan energy sumer. Again, digitalisation technologies are particularly important in this area.
- **Smart cities and communities** that integrate the different technologies available in urban environments to keepme back on the sustainability and quality of life of citizens. The objective of climate neutrality is pursued in theCIUs, with a systemic and multi-actor approach, and with the citizen at the centre of decisions. Involving municipalities, citizens, universities, businesses, among others, Spain has successful pilot experiences in various cities under the Positive Energy District (PED) projects, which should be an example toboost innovation and replicate the best solutions. There are 7 Spanish cities selected in the Horizon Europe Cities Mission, committed to reaching climate neutrality by 2030.

These priorities respond to the overall objectives of the NECP without losing sight of the starting point and specific context of our country.

Table 2.10 summarises the correlation between the overall objectives of the NECP and the R& I priorities for energy and climate:

Table 2.10. Objectives and priorities

NECP objectives	Special Objectives	R & I & c priorities and objectives
32 % reduction in greenhouse gas (GHG) emissions compared to 1990 and 55 % compared to 2005	Residential, commercial and services	**Smart solutions for the energy consumer** **Smart Cities and Communities** **Heating and cooling systems** **Participation of renewable energy in district heating and cooling networks** **Use of renewable energy in buildings** **Thermal and electrical storage** **Renewable energy produced by cities, energy communities and self-consumers** **Active and passive solutions in the energy renovation of Heat Bombs buildings** **Intelligent energy management systems in buildings**
	Transport	**Sustainable transport: promoting a model change in the transport system** **Development of sustainably sourced advanced biofuels from renewable raw materials** **Production of green hydrogen and its application in transport** **Mobility and stationary batteries** **Renewable fuels (biofuels, alternative renewable fuels, hydrogen...)**
	Electricity Generation	**Batteries for mobility and stationary Clean energy/priority renewables Safe nuclear generation**
	Industrial	**Low-carbon technologies, as a priority** **Innovation and energy competitiveness** **Renewable energy to meet industrial process heat needs at different temperatures** **Waste heat recovery** **Production of clean hydrogene**
48 % of renewables over the end use of the energy	Innovation in EERR technologies where there is already a competitive position	**Photo-voltaic energy (PV)** **Concentrated Solar Energy (CSP)** **Onshore and Offshore Wind Energy** **Deep and shallow geothermal** **Ocean Energy**
	Technologies contributing to managemability	**Energy Solar Concentration (CSP) Digitalisation of the electricity system** **Biomase** **Hybrid solutions**
43 % improvement in energy efficiency	Residential, urban and citizen	**Digitalisation of the electricity system** **Smart solutions for the energy consumer** **Smart Cities and Communities** **Heating and cooling systems** **Participation of renewable energy in district heating and cooling networks** **Use of renewable energy in buildings** **Renewable energy produced by cities, energy communities and self-consumers** **Active and passive solutions in the energy renovation of buildings** **Harnessing waste heat, energy efficiency in industrial processes**
	Industrial	
81 % renewable energy in electricity generation	Distributed generation	**Digitalisation of the electricity system for a secure and resilient system** **Storage systems**

In order to achieve these priorities, Spain is willing to participate in international consortia of bothinventions and industrial innovation and implementation. Particularly important will be participation in future calls for the Co-Fund CET (*Clean Energy Transition*) and*Driving Urban Transition*(DUT) energy partnerships, in the SET-Plan Implementation Working Groups (IWG), as well as in Horizon Europe missions and Mission Innovation missions, leading those areas where it is scientifically and technically most passionateand seeking complementarities with leading countries in other priority technologies with lower development in Spain.

2.5.3. Specific objectives in climate change science

From the R & I point of view, further scientific knowledge of oceans, terrestrial ecosystems and the atmosphere is indispensable for their modelling and assessment of adaptation and mitigation strategies. Given its geographicalsituation and importance for the Spanish economy, particular attention needs to be paid to aspects relating to water resources, in particular integrated water management systems, and technologies for efficient use and reuse in irrigation, rural, urban and industrial environments, as well as activities that make it possible to advance the protectionof aquatic ecosystems, seas and oceans.

Given their particular relevance and impact on the whole territory, monitoring technologies and systems aimed at preventing and mitigating forest fires, protecting and restoring biodiversity, and natural, rural and urban environments should be promoted. In particular, the following actions shall be encouraged:

- Obtaining atmospheric, oceanographic and terrestrial observation data that feed into the models thatdefine projections
- Improving the accuracy and predictability of models, to better address adaptation to the impact of climatecam in our country
- Generation of climate change scenarios to visualise their impacts, regionalised and for each of the climate variables
- Dissemination of scenarios to encourage the adaptation of the various economic sectors, especiallythose considered most vulnerable

Climate-oriented R & I activities and objectives aim to contribute to the overall objectives of the Second NACC and to respond to the commitments of the Paris Agreement and the EU's 2030 Framework on Goingand Climate, the European Strategy on Adaptation to Climate Change and Roadmap 2 020 in the diffuse sectors, as well as to the objectives of Law 7/2021 on Climate Change and Energy Transition, Long-term Decarbonisation Strategy 2050 (LDS) and the Just Transition Strategy. In addition to meeting these objectives and commitments, the R & D & I perspective on climate change envisages the efficient use of natural resources andenvironmental integrity as a factor in the country's competitiveness and socio-economic development. Research, development and innovation must facilitate the transition to a production model that reduces the pressure on the environment, natural resources and triggers the application of less polluting and better monitored industrial processes.

In this case too, Spain is willing to participate in international consortia to carry out theseactivities, both for research and innovation, and for the implementation of solutions at national, regional and local level. In this line, participation in the 5 Cluster Calls. Horizon Europe Climate, Energy and Mobility will be key; as well as in Horizon Europe calls associated with the European Mission on Adaptation to Climate Change[51].

2.5.4. Competitiveness of the economy

The energy system is a basic pillar of a country's economy. The NECP not only favours decarbonisation, it also has a positive effect on the industrial and productive fabric, on large, small and medium-sized enterprises, as well as on households and people.

51EU Mission: Adaptation to Climate Change

These benefits are the combined result of three main effects that together represent a significant improvement in the level of competitiveness:

- A broad-based increase in energy efficiency across sectors, resulting in less energy per unit of GDP needed in 2030. The policies included in the plan foresee an improvement in final energy consumption of 43 % in 2030.

- A significant substitution of imported fossil fuels with renewable energy from indigenous sources thatfurther reduces the cost of electricity. According to REE estimates, in this new scenario with a higher shareof renewables in the electricity sector, the average marginal cost of generation, which will be reduced by an additional 45 % in 2030, compared to the target scenario of the 2021-2030 NECP, will be further reduced.

- A reduction in external energy dependency that minimises the negative effects of the high volatility of fossil fuel markets. Our country's degree of dependence is currently 73 % and, according to the plan's forecasts, it will reach 50 % in 2030.

Spain is one of the European countries with the greatest potential for using renewable energies, owing to the great potentialfor renewable resources, Mediterranean and Atlantic winds, a high level of sunshine, as well as large forests and significant water resources, which are complemented by a business, technological, innovative and knowledgeablefabric in this area.

The reduction of electricity prices through the use of renewable technologies, as well as the value that many of them bring to the energy system, will bring a clear competitive improvement, especially for electricity-intensive businesses. In addition, the expected improvements in energy efficiency have a positive impact on the industrial and productive fabric in particular, on large, small and medium-sized enterprises, as well as on households and people.

Our country also has leading companies at international level in sectors that will be important for energyprocurement and an important industrial fabric in the field of renewable energy. It also has a leadingknowledge capital with pioneering institutions such as CIEMAT, CSIC, CENER, the National Hydrogen Centre (CNH2), IDAE, ERCC REE, as well as regional research centres, universities,cross-border tec networks and unique energy and climate infrastructure.

This Plan addresses the transformation of Spanish industry towards sustainability, by decarbonising this economic sector, using the PERTE for industrial decarbonisation as the main driving axis. This Strategic Plan will per se mitigate, through public-private partnerships, implement comprehensive energy efficiency measures, increase the presence of renewable energies, and implement best available techniques to reduce emissions from industrial sectors.

In short, the NECP allows Spain to aspire to be one of the leading countries of the European Union in terms of energy transition. This is a transformation in which the Spanish economy has much to gain in terms of competitiveness of its economy through prosperity, energy security, industrial employment generation, innovation, technological development and the elimination of energy poverty.

POLICIES AND

MEASURES

3. POLICIES AND MEASURES

This section sets out the policies and measures to achieve the objectives set by the Plan. The previous integrated National Energy and Climate Plan (NECP) 2021-2030 included 78 measures that have been updated and implemented, referring totheir current state of implementation. In addition, in this NECP 2023-2030 the number of measures has been extendedto 110 measures. This process results from the strengthening of the different dimensions, as well as from the collection of analyses and proposals of strategies and roadmaps.

The measures have been grouped according to the size of the Plan and are set out in the following table, highlighting in a different colour those added in this Plan compared to those included in the previous Plan.

Table 3.1. Measures in the Plan

NECP MEASURES
3.1 Decarbonisation dimension
Measure 1.1. Development of renewables compatible with biodiversity and ecosystem protection
Measure 1.2. Development of renewables compatible with territory and development rural
Measure 1.3. Development of new installations for electricity generation using renewables
Measure 1.4. Development of innovative renewable energy installations
Measure 1.5. Energy storage
Measure 1.6. Demand management and flexibility
Measure 1.7. Adaptation of electricity grids for the integration of renewables
Measure 1.8. Development of self-consumption with renewables and distributed generation
Measure 1.9. Development of new hydroelectric storage capacity
Measure 1.10. Decarbonisation of the industrial sector
Measure 1.11. Framework for the development of renewable thermal energy
Measure 1.12. Biofuels and other renewable fuels in transport
Measure 1.13. Decarbonisation of the maritime transport
Measure 1.14. Decarbonisation of air transport
Measure 1.15. Development of biogas and biomethane
Measure 1.16 Development of renewable hydrogen
Measure 1.17. Plan for the repowering and repowering of existing renewable power generation projects
Measure 1.18. Strategic autonomy and value chain
Measure 1.19. New business models for the energy transition
Measure 1.20. Promotion of recruitment bilateraland the promotion of forward markets for renewable electricity
Measure 1.21 Specific programmes for the biomass harvesting
Measure 1.22. Unique projects and strategy for sustainable energy on islands
Measure 1.23. Energy Communities
Measure 1.24. Citizenship in the centre
Measure 1.25. Fair transition strategy

Measure 1.26.	Public procurement of renewable energy
Measure 1.27.	Training of professionals in the renewable energy sector
Measure 1.28.	Review and simplification of administrative procedures
Measure 1.29.	Knowledge generation, dissemination and awareness raising
Measure 1.30.	European Emissions Trading System
Measure 1.31.	Life cycle assessment of buildings
Measure 1.32.	GHG emission reduction in the agriculture and livestock sectors
Measure 1.33.	Reduction of GHG emissions in waste management
Measure 1.34.	Reduction of GHG emissions related to F-gases
Measure 1.35.	Forest sinks
Measure 1.36.	Agricultural sinks
Measure 1.37.	Taxation

3.2 DIMENSION ENERGY EFFICIENCY

Measure 2.1.	Low-emission zones and sustainable urban mobility
Measure 2.2.	Modal shift in freight transport with a higher presence of rail
Measure 2.3.	Refurbishment of the rolling stock of means of transport with more efficient ones and efficiency improvements in management
Measure 2.4.	Improving the efficiency and sustainability of ports
Measure 2.5.	Promotion of electric vehicles
Measure 2.6.	Improvements in technology and process management systems for non-energy intensive industries
Measure 2.7.	Improvements in technology and process management systems for energy-intensive industries
Measure 2.8.	Energy efficiency in existing buildings in the residential sector
Measure 2.9.	Renewal of residential equipment
Measure 2.10.	District heating and cooling networks in the residential sector
Measure 2.11.	Energy efficiency in buildings in the tertiary sector.
Measure 2.12.	District heating and cooling networks in the tertiary sector
Measure 2.13.	Energy efficiency in cold generating equipment and large air-conditioning installations in the tertiary sector and public infrastructure
Measure 2.14.	Energy efficiency in farms, irrigation communities and agricultural machinery
Measure 2.15.	Energy efficiency in the fisheries sector
Measure 2.16.	Promotion of energy performance contracting
Measure 2.17.	Public sector: accountability and energy efficient procurement
Measure 2.18.	Energy audits and energy management systems
Measure 2.19.	Training of professionals in the energy efficiency sector
Measure 2.20.	Communication and information on energy efficiency
Measure 2.21.	Other measures to promote energy efficiency: the transition in high-efficiency cogeneration
Measure 2.22.	Financial measures: National Energy Efficiency Fund
Measure 2.23.	Energy Saving Certificate System

3.3 DIMENSION ENERGY SECURITY

Measure 3.1.	Plan + Energy Security
Measure 3.2.	Maintenance of minimum safety stocks of petroleum products and gas
Measure 3.3.	Reducing energy dependency on islands
Measure 3.4.	Recharging points and alternative fuels infrastructure
Measure 3.5.	Boosting regional cooperation
Measure 3.6.	Deepening contingency plans
Measure 3.7.	Planning for the safe operation of a decarbonised energy system
Measure 3.8.	Strategic raw materials for the energy transition
Measure 3.9.	Cybersecurity in the Energy Sector

3.4 DIMENSION INTERNAL ENERGY MARKET

Measure 4.1.	Implementation of the new electricity market design
Measure 4.2.	Fight against energy poverty
Measure 4.3.	Capacity markets
Measure 4.4.	Increasing electricity interconnection in the Internal Market
Measure 4.5.	Electricity Transmission Network Development Plans 2021-2026 and 2025-2030
Measure 4.6.	Electricity market integration
Measure 4.7.	Protection of electricity consumers and increased competition
Measure 4.8.	Access to data
Measure 4.9.	Gas market integration
Measure 4.10.	Protection of gas consumers
Measure 4.11.	Improving the competitiveness of the gas retail sector
Measure 4.12.	Iberian HydrogenCorridor. H2MED
Measure 4.13.	Local electricity markets

3.5 DIMENSION RESEARCH, INNOVATION AND COMPETITIVENESS

Measure 5.1.	Strategic action on climate, energy and mobility
Measure 5.2.	Implementation of the SET-Plan
Measure 5.3.	Supplementary plans in the energy and climate sectors
Measure 5.4.	Scientific and technical infrastructures in the energy and climate sectors
Measure 5.5.	Public Purchase of Innovative Technology (CPTI) and Pre-Commercial Technology (PPP)
Measure 5.6.	Strengthening public venture capital for technology transfer in energy and climate
Measure 5.7.	Regulatory amendments to facilitate research and innovation
Measure 5.8.	Promoting public-private partnerships
Measure 5.9.	Renewable energy co-owned research centres
Measure 5.10.	Promote an innovation hub on renewable energy, storage and hydrogen at the City of Energy Foundation, CIUDEN

Measure 5.11. Improving SECTI governance and coordination

Measure 5.12.	Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition
Measure 5.13.	ALINNE Technology Platforms and Alliance
Measure 5.14.	Enhancing the internationalisation of SECTI actors in the field of energy and climate
Measure 5.15.	Spanish contribution to R & D & I for fusion energy
Measure 5.16.	Mission Innovation 2.0
Measure 5.17.	European financing mechanisms for energy and climate innovation
Measure 5.18.	Regulatory test bank in the electricity sector

3.6 CROSS-CUTTING ASPECTS IN THE GREEN TRANSITION

Measure 6.1	Gender perspective
Measure 6.2	Mainstreaming climate change adaptation objectives
Measure 6.3	Integration of the objectives of the National Air Pollution Control Programme
Measure 6.4.	Recovery and resilience facility
Measure 6.5	The Just Transition Fund
Measure 6.6.	Social Climate Fund
Measure 6.7.	Common Agriculture Policy
Measure 6.8	Cohesion Policy
Measure 6.9.	Etratégic environmental assessment
Measure 6.10	Demographic challenge

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

3.1. Decarbonisation dimension

The set of measures proposed in this update of the NECP lead to a 32 % reduction in greenhouse gas emissions compared to 1990, a reduction of 55 % compared to 2005; and a 48 % penetration of renewable energy into energy end-use. Along this dimension,measures related to the deployment and integration of renewable energy, emission reductions through various mechanisms, reduction of these emissions through increased sinks, as well as other cross-cutting issues, be it through taxation or the social dimension of the energy transition, are proposed.

3.1.1. Renewables

The measures included in this dimension address both the decarbonisation of the power sector and the decarbonisation of other end uses, including the provision of renewable heat and cold. As part of the transformation of the electricity sector, theincrease in the presence of renewables in the electricity sector is fostered, which has the effect of driving the electrification of the economy in the industrial and transport sectors.

For its part, the PERTE for industrial decarbonisation and the other measures dedicated to the transformation of thisarea promote the reduction of emissions in this area, either through the use of new green energy carriers or through the transformation and modernisation of the productive sectors. The reduction of emissions in the residential and service sectors is also relevant, mainly through the increase in electrification and the deployment of self-consumption.

There is now a new reality, in which there are many renewable projects, which makes it necessary to take action in determining the areas for the development of facilities, taking into account two factors: collaboration with the localauthorities and ensuring the creation of benefits for local communities. To this end, work will be done on a new framework to boost the identification of new areas for renewable projects together withterritorial administrations and facilitate the benefit of local communities.

MEASURE 1.1. DEVELOPMENT OF RENEWABLE ENERGY COMPATIBLE WITH BIODIVERSITY AND PROTECTION OF THE ECOSYSTEMS

a) Description

The development of renewable technologies is essential to decarbonise the energy system andto deepen the needs of the green transition. The climate change caused by humanity is already increasing the frequency of extreme weather and climate events in all regions of the world. This has resulted in widespread adverse impacts, related losses and damage to nature and people (Intergovernmental Panel on Climate Change, 2023). These impacts will accelerate if the ambition ofthe measures is not lowered.

The National Strategic Plan for Natural Heritage and Biodiversity at 2030 (PEEPNyB), the Forest Strategy orHorizon 2050 or the Spanish Forestry Plan 2022-2032 identify climate change as one of the main drivers of biodiversity loss, from genetic to ecosystem level. With regard to biodiversity, geo-diversity and the functioning of ecosystems, the scenarios foresee that climate change will have mostly negative effects, which will, in some cases exponentially, be exacerbated by an increase inglobal draught. Even with an increase of between 1.5 °C and 2 °C in the temperature, drastic decreases are expected in most of the areas of distribution of terrestrial and aquatic species, and an equally significant effect on the environment, substantially increasing the risk of global extinctions and deterioration of ecosystems, isspecifically due to the decoupling of biological rates.

In addition, climate change has a multiplier effect of other threats relevant to biodiversity, such as the increase of invasive alien species, habitat degradation and loss, erosion and de-sertification processes, or the increase and aggravation of forest fires.

Combined action on climate change and biodiversity loss exacerbates health risks, not onlythrough extreme climate events (droughts, heatwaves, floods), but also by supporting greater and faster loss of ecosystem services, including access to clean water

and air, or provision of food andbasic ducts for medicines, as well as the expansion of disease transmitter vectors.

Biodiversity conservation also acts as a tool for climate action. As the NAPCP points out, the so-called 'nature-based solutions' seek precisely to make the best use of this protective role, not only in rural areas but also in cities.

Modelled global trajectories that limit warming to 1.5 °C without overshoot or limited overshoot, and those limiting warming to 2 °C, imply rapid and deep and in most cases immediate reductions in GHG emissions across all sectors. Mitigation strategies modelled to achieve these reductions include the transition from fossil fuels to very low or zero carbon energy sources, such as renewables, efficiency improvement and demand-side measures (IPCC, 2022). The NECP therefore focuses not only on the need for greater penetration of renewable technologies, but also on increasing energy efficiency and solutions such as electrification of energy end uses. The deployment of renewable technologies is a priority to reduce emissions, contribute to mitigation and reduce the impact of climate change on Spanish and international ecosystems. However, their deployment should be ensured by ensuring that potential local impacts on terrestrial and marine biodiversity, which could result from the deployment of renewable energy generation plants in the territory, are avoided and minimised, so that sustainable development is possible that increases resilience to climate change and facilitates thecontainment and restoration of biodiversity.

As the PEEPNyB points out, changes in land use, mainly due to agricultural intensification andbooming, are one of the main drivers for biodiversity degradation. In this context, the increasingplanting of renewable energy in natural land and marine areas also requires land use change, which may be significant depending on the type of projects and their accumulation.

Therefore, both the Strategic Environmental Declaration (SEA), which concluded the Strategic Environmental Assessment procedure for the 2021-2030 NECP, and the EAD that was issued after the environmental assessment of the 2023-2030 NECP update, state that all projects developing the NECP mustincorporate the criterion of no net loss of biodiversity into their design, which will result in the application of the appropriate preventive and corrective measures, the assessment of residual impacts and the compensation ofmyself. Similarly, the measures resulting from the plan must be compatible with the plans for restoration,-containment and management of fauna and flora and move away from protected natural areas. In particular, the EAD recommends avoiding the occupation and deterioration of, inter alia, habitats of Community interest, habitats of species of Community interest, protected natural areas, in accordance with Law 42/2007 of 13 December on Natural Heritage and Biodiversity, the Natura 2000 network, areas protected by international instruments, birdbearing areas (IBA), areas of importance and criticism subject to conservationand restoration plans for protected species. key areas of presence of critically declared species, areas of passage and dispersion of endangered species (ecological connectivity), as well as bird protection areas against collision and electrocution on high-voltage power lines. Natural areas protected by the Autonomous Communities will also be taken into account. These same determinations have been reaffirmed by the EAD issued in the light of the updated PNIEC 2023-2030. It has been added, among other things, that theindications in the Strategy and guides relating to the conservation of steppe birds, as well as the planning resulting from the Nature Restoration Regulation (EU), must be taken into account and reinforces the importance of environmental monitoringof the facilities and the need for the generation of mapping tools. The environmental impact statement for each of the projects to be developed is considered to be the tool that would enable these aspects to be integrated.

Article 21 (2) of Law 7/2021 of 20 May on Climate Change and Energy Transition states that, in order to ensure that new plants producing energy from renewable energy sources do not have a severe impact on biodiversity and other natural values, a zoning will be established on account of their importance for biodiversity, connectivity and the provision of ecosystem services, as well as other environmental values. To this end, MITECO is mandated to draw up and regularly update amap that reflects this zoning, which must incorporate the information that emergesfrom biodiversity guidelines, and will ensure, in coordination with the Autonomous Communities, that renewable energy projects are deployed preferably in sites with a lower impact.

Since December 2020, MITECO has had an environmental zoning for the deployment of renewable,wind and photovoltaic energy, which establishes 5 environmental sensitivity classes (Maxima, considered as Non-Apta; Very high; High; Moderate; Low) for each project typology analysed. Both maps have been updated in May 2022.

The Strategic Environmental Declaration of the PNIEC 2021-2030, as well as the EAD for the update of the2030 NECP, note the

value of these instruments, as they will enable the developer of these facilities to guide them in choosing the most environmentally viable location. Its usefulness is also reflected in the various developments inthe promotion of renewables, such as Royal Decree 1183/2020 of 29 December 2003 on access to and connection to electricity transmission and distribution networks, which allows socio-economic and environmentalcriteria to be incorporated into access capacity competitions, making it possible to establish a score according to the environmental impact, which will take into account zoning.

Furthermore, in view of the competences of the Autonomous Communities in terms of biodiversity conservation and spatial planning, the aforementioned EAD of the 2021-2030 PNIEC and, in addition, the EAD forthis update recommends promoting the development of the energy and climate plans for theautonomous communities, as part of the overall spatial planning policy of each community, and incorporating environmental and territorial criteria into the planning, taking into account those laid down in the NECP through its strategic environmental assessment, and the determinations contained in both DAES, which should be taken into account ina complementary manner. In particular, the basic content of these plans refers to the approval of zoning of environmental and territorial suitability for the deployment of renewable energy installations, in particular solar photovoltaic and wind energy, depending on the environmental and territorial sensitivity to the development of such projects in such a way as to facilitate the process of processing the installations.

Such instruments facilitate the design and presentation of more technically robust renewable generation projects from an environmental perspective. However, in accordance with the guiding principle of the Law on Climate Change and Energy Transition on environmental protection and the preservation of biodiversity, public administrations should promote tools that encourage renewable projects not only to minimise their associated environmental impact, but also to promote synergies with climate action on adaptation and other policies and actions linked to the protection and restoration of biodiversity. To this end, the DAE of the PNIEC 2021-2030 pointed to the need to draw up information guides to good practice, including the possibility of proposing common criteria to serve as a reference for the legislation of the Autonomous Communities and the respective municipal ordinances. These instruments are again recognised in the EAD of the NECP 2023-2030.

As regards the protection of the marine environment, and in accordance with the provisions of the DAES of the NECP 2021-2030 and its update, the maritime spatial plans for the five Spanish marine districts (MEPs) incorporate areas of high potential (PAAs) for the protection of biodiversity and, as a relevant novelty, APAs for the development of offshore wind energy, determined following a detailed work and analysis process in which multiple variables have been incorporated: availability of the wind resource, affecting marine biodiversity, safety in navigation, aviation safety, and national defence; and reducing conflicts with other present or future uses and activities, such as aquaculture, tourism, or fisheries. It should be noted that the MEOP states that areas of high potential cannot be considered as areas recommended for the implementation of offshore wind projects from an environmental perspective, but are recognised as areas with potential, which means that their environmental viability must be assessed and demonstrated during the environmental assessment process applied to each project individually.

With a view to promoting a continuous dialogue on the development of offshore wind energy in nearbycountries, in particular as regards its compatibility with other economic activities in the marine environment, a Bureau of Labour has been set up representing the fisheries sector and the General State Administration.

Furthermore, the 2021-2026 Electricity Transmission Network Development Plan includes, among itsenvironmental targets, soil conservation, avoiding erosive processes, preserving aquatic ecosystem values, minimising the impact on biodiversity, ensuring ecological connectivity, minimising the occupation of protectednatural PACIOS and the Natura 2000 network, minimising the impact on birds and endangered species. preventing environmental deterioration of the marine environment, reducing health conditions, limiting the deterioration of landscape resources, minimising the impact on elements of cultural heritage, minimising the ecological footprint ofenergy infrastructure and promoting the economic and social development of rural areas, among others.

Finally, as has been pointed out by all the stakeholders concerned, this process goes beyond the action of public administrations, requiring spaces for participation and consultation in which to agree on proposals, best practices and tools to ensure compatibility between the deployment of renewables and the protection of biodiversity. To this end, and drawing on the experiences of previous processes, MITECO carried out a process of listening to territory and renewables, which, among other issues, addresses this issue,

opening up channels for dialogue to articulate new solutions.

The NECP therefore focuses on renewables, flexibility solutions that promote their integration into the core, energy efficiency, particularly in sectors such as industry, mobility or buildings, and electrification of demand. The deployment of renewables is necessary to achieve the objectives of reducing greenhousegases and mitigating climate change. Energy efficiency reduces our share of primary energysources and thus fossil fuels, but also reduces the need for new renewable power, thereby reducing deployment needs on the territhorium. The PNIEC's commitment to electrification as a decarbonisation vector also contributes to thereduction of gaseous pollutant emissions from combustion processes that are replaced by these technologies.

As regards the integration of renewables into the territory in a manner compatible with the conservation of biodiversity and the protection of ecosystems, the strategic environmental assessment procedure to which this Plan has been subject reinforces the environmental guarantees resulting from the evaluation, analysis and exchange oftraining with promoters, administrations and various entities involved in the process. Boosting renewable energy projects does not imply reducing the environmental conditions imposed for the deployment of such infrastructure. A renewable energy project must be subject to an environmental assessment procedure and must have either a favourable environmental impact declaration (DIA) or a favourable environmental report, as well as authorisations from other authorities and entities. These environmental impact assessment processes result in a number of conditions and measures for the implementation of the project, highlighting the preventive and corrective measures that have to be applied during the construction and operation phases, as well as compensatory measuresto compensate for residual impacts that could not be eliminated, and the corresponding studies prior to their authorisation and monitoring during their implementation are required.

b) Objectives addressed

- Strengthen the framework for the development of renewables compatible with biodiversity conservation and rural and coastal development, encouraging the appropriate location of different technologies and their compatibility with other land uses.
- Strengthen societal knowledge exchange, participation and awareness in order to ensure renewable deployment compatible with biodiversity conservation and rural and coastal development.
- Ensuring climate-resilient development.

c) Policy mechanisms

- Promote **guides and best practice tools** that encourage the submission of robust projects from an environmental perspective and can be included in the conditionality of environmental assessment declarations.
- **Promote increased knowledge**, through research and innovation, as well as environmental monitoring in existing installations, to minimise the impacts of renewable installations on terrestrial and marine biodiversity and ecosystem services.
- Promote the generation of information necessary to monitor the effects of these installations on fauna and flora both before their installation (during the preparation of the project) and during the installation, operation and end-of-life phases (dismantling).
- Strengthened collaboration and coordination between administrations and actors to promote renewable deployment compatible with biodiversity conservation, and for the benefit of local communities.
- Work will be promoted to define the environmental guidelines and criteria for energy planning on the deployment of renewables and their associated electricity infrastructure.
- Coordinated planning in the different regions will be ensured.
- MITECO will keep up to date, including the information generated by biodiversity monitoring, the environmental zoning for the deployment of renewable, wind and photovoltaic energy, with which it has existed since December 2020 and was updated in

May 2022, including the best available information and scientific knowledge, in particular that resulting from the aid provided by the Ministry and financed by the PRTR, through the Biodiversity Foundation.

- Efforts will be **made to complete territorial zoning with the best available information**, especially information relevant for biodiversity conservation as opposed to the deployment of renewable energy generation facilities. In particular, it shall include the information that is being generated from biodiversity tracking, and **shall include data relevant to areas of biodiversity interest**, such as areas important for **steppe** birds, as well as other groups and species particularly vulnerable to the deployment of infrastructure for the generation of this type of energy.

- Particular attention shall be paid to the proper planning and location of power lines and other energy transmission infrastructure in order to minimise impacts on terrestrial and marine biodiversity.

- It shall be ensured that zoning also considers measures to ensure that **connectivity of ecosystems is not compromised**, especially ecological corridors of migratory species, and to **prevent fragmentation of the territory and loss of biodiversity, inter alia by collision with infrastructure or electrocution.**

- Care shall be taken, both in the terrestrial and marine environment, to avoid disturbance of natural and semi-natural habitats, flora and fauna and habitats of importance for fauna, and priority shall be given to ensuring that protected areas, Natura 2000 sites and areas protected by international instruments are not adversely affected, **minimising occupation** and establishing minimum **distances appropriate to each type of site to ensure their conservation and integrity. For this purpose, account should also**be taken of species conservation and restoration plans, Natura 2000 sites management plans or other legal instruments indicating key elements and conservation objectives, as well as other relevant information.

- In the marine environment, the zoning established by the MEOP for the installation of renewable energy will be taken into account, and it is essential that the environmental viability of these areas be assessed and demonstrated during the environmental assessment process applied to each project individually. It shall also be ensured that the spatial location of the areas with the highest potential for **offshore wind energy** development does not compromise the connectivity of ecosystems, especially migratory species corridors. To this end, among other actions, work will be undertaken to develop a methodological guide for the assessment of offshore renewable energy projects.

- Priority shall be given to the location of new installations and distribution lines in **areas already degraded and of low environmental quality**, areas awaiting dismantling or construction, including for industrial use, and encouraging self-consumption in order to reduce the natural area affected.

- **Compliance with ecological flow schemes for** hydropower generation projects is essential, as well as avoiding disruption of river regimes and promoting the maintenance of river permeability, while not increasing the barrier effect. Where the environmental impact assessment procedure establishes the need to implement compensatory measures, it shall be ensured that they are applied reliably in compensation to the impacts that have occurred, in particular in relation to the occupation of ecosystems and their restoration in other locations, helping to compensate for the biodiversity and landscape values affected.

- As regards the **generation of knowledge and the monitoring of compatibility of renewables in the territory:**

  - A tool will be developed to collect information on the evolution of the deployment of renewable energy generation projects and storage systems, as set out in the Strategic Environmental Declaration of the update of the NECP 2023-2030.

  - Information collection systems will be strengthened to respond to new indicators introduced through the EAD corresponding to the update of the NECP 2023-2030. This process of gathering and compilinginformation will be carried out in coordination with the promoters and the Autonomous Communities, both for new facilities and for facilities in service.

  - In order to promote more environmentally friendly projects that facilitate synergies with other actions to protect and restore biodiversity, **work will be carried out on practical guides to be drawn upwhich**, among other objectives, will guide the integration of biodiversity conservation into the design and assessment of renewable installations. In any case, **use will be**

made of existing documents, such as the 'Methodological Guide for assessing the impact of solar installations on steppe avian species' of the Subdirectorate-General for Land and Marine Biodiversity of MITECO, the 'Tooological Guide to-Environmental Impact Assessment on the Natura 2000 Network'. Criteria used by the Subdirectorate-General for Biodiversity and the Natural Environment to determine the damage to the integrity of sites in the Natura 2000 network as a result of affecting habitats of Community interest. January 2019" of MITECO, among others, as well as other documents that are being developed. It should be noted that the 'Methodological Guide for Environmental Impact Assessment on Biodiversity and Marine Spaces' andthe 'Guide to good practices for coexistence, conservation and protection of fauna in environmental assessment processes and in the design and operation ofsolar photovoltaic plans' are currently being drawn up.

- **Analysis**, in application of **the NAPCP, of the potential for hydropower and biomass production in various climate changescenarios**, for integration into energy planning and successive integratednational energy and climate plans.

- Where the environmental impact assessment procedure so provides, due care shall be taken to **ensure that wind farms and solar installations** have an impact on fauna and flora,geological sites and habitats, by developing common and standardised monitoring systems and methodologies, which must be complied with in the relevant environmental impact statements andreports. It is worth noting in this regard, particularly in relation to avifauna, the recent public consultation prior to the draft Royal Decree establishing measures for the protection of avifauna against collision and electrocution on high-voltage power lines and for the reduction of mortality in wind turbines (amending Royal Decree 1432/2008), with the aim of improving measures for the protection of avifauna against collision and electrocution in high-voltage power lines to reduce mortality in wind turbines.

- A tool will be developed to collect information on the evolution of the deployment of renewable energy generation projects and storage systems, so that the environmental impactsof the NECP can be monitored as set out in the Environmental Monitoring Programme for the update of the 2023-2030 NECP.

On **innovation, digitalisation and new technologies:**

- Research will be encouraged for the **development of guidelines and criteria for environmental planning** and for the development of good practices that promote biodiversity in the deployment of renewable energy.

- **Digitalisation and uptake of new technologies for environmental monitoring of renewable injections will** be advanced, improving learning about the effects of the energy transition.

- Research will be encouraged to improve knowledge in **systematisation of espe monitoring,** as well as interactions between human activities, species and habitats, the impact of renewableactors on terrestrial and marine biodiversity and ecosystem services and on the local population.

- **The development of applicable innovative technologies, methodologies and processes that minimise the impacts of renewable energy on natural heritage and terrestrial and marine biodiversity shall be encouraged**. In particular, to strengthen, within the framework of R & D & I, action lines aimed at developments that have a **lesser impact on biodiversity** and ecosystem services, and at optimising the occupied territory, seeking to make it compatible with existing activities. Energy efficiency solutions, or flexibility technologies, such as energy storage, will be key to optimising the use and production of energy and, consequently, the occupation of the territory.

As regards the promotion of **stakeholder participation:**

- **Information will be collected through the environmental monitoring and monitoring programmes**, so that the data can be reported by developers and their information included in **theIntegrated Biodiversity Information System of the Directorate-General for Biodiversity and Desertification (DGBBD)**. It is also essential to have detailed knowledge of the area under which electricitygeneration calls with renewables and associated infrastructure are occupied, and, in particular, of the area affected in protected areas. To this end, the creation of mapping tools will be encouraged to provide this up-to-date geographical information.

- A **repository with the approved regulations shall be generated and kept up to** date.

-As regards **natural heritage and the rural environment**:

- With the knowledge gathered, and in application of the PEEPNyB, work will be done **to develop methods to minimise the impacts of renewable energy on natural heritage**, which will be included inthe environmental assessment declarations.
- Care shall be taken to avoid affecting woodland and shrub forest formations of high forest value.
- **The verification of the sustainability of raw materials used as biomass and the indirect land-use change impact it may cause, as well as the study of their impact onnatural farming, biodiversity and ecosystems prior to their alteration, shall** be promoted.
- **The reduction of light pollution throughout the territory will** be promoted, with the dual objectiveof reducing GHG emissions and reducing the impact on fauna.
- Knowledge, exchange, participation and awareness in **rural** areas ofclimate and energy transition will be deepened to promote renewable deployment compatible with **biodiversity and rural development**. To this end, active spaces for engagement and dialogue will be maintained, promoting multi-directional sources of information, i.e. with top-down, bottom-up and co-produced information flows.
- Work will continue to ensure that renewable energy and gene storage instrumentsinclude, in addition to economic criteria, new criteria associated with environmental sustainability, value chain relevance, territorial development and social cohesion, innovation or thenomic socio-ecological impact of the project.

(D) Responsible

MITECO, IDAE, Autonomous Communities and local authorities.

MEASURE 1.2. DEVELOPMENT OF RENEWABLE ENERGY COMPATIBLE WITH THE TERRITORY AND RURAL DEVELOPMENT

a) Description

According to Eurobarometer results52, more than half of European society (58 %) think that the transition to a green economy should be accelerated in the face of energy price hikes and gas supply concerns following Russia's invasion of Ukraine. Close to nine out of ten Europeans (87 %) consider it important for the EU to set ambitious targets to increase the use of renewable energy, and a similar number (85 %) believe it is important for the EU to take action to improve energy efficiency, for example by encouraging people to isolate their homes, install solar panels or purchase electric cars. 84 % of Europeans agree that tackling climate change and environmental issues should be a primething to improve public health, while 63 % of respondents agree that preparedness for the effects of climate change can have positive results for EU citizens. In this context, it should be borne in mind that part of this development of renewables is deployed in rural areas, which, in parallel, face the challenges associated with the demographic challenge.

Although there are significant benefits related to the deployment of renewables (employment, tax revenues, traction over other activities), a debate has emerged in society about the process, pace and nature of this transformation, including, inter alia, how to better articulate a fair distribution of the benefits and costs of the energy transition, in its different dimensions: territorial, social, environmental, industrial.

In order to meet this challenge, i.e. to make the orderly deployment of renewable energies compatible with rural development, all the actors involved must work together to adapt the development of renewables with the establishment of socio-economic benefits in the territory, making this deployment a tool for territorialcohesion, boosting opportunities for both local communities, with a particular impact on those aimed at reducing the gender gap and situations of social inequality; as for the rural industrial and economic fabric, with a high presence of SMEs and the social economy; this is without losing sight of the compatibility with the protection of the environment, the landscape and the connectivity of habitats in the territory. This promotes the three key aspects of sustainable development: people, competitiveness and environment.

Building climate resilience needs to apply an approach from equity so that all relevant events, including rural communities, can participate in decision-making processes at all levels and seize the opportunities associated with the transformation of the energy system. Thus, Eurobarometer also shows that **most EU citizens are already taking climate action in their personal sphere** (93 %) and knowingly opting for sustainability in their daily lives. However, when asked who is responsible for tackling climate change, **citizens underlined the need for other reforms to accompany individual action**, pointing also to the responsibility of national governments (56 %), the EU (56 %) and business and industry (53 %). It is therefore about, by involving all sectors involved, advancing the information needs of local entities and communities in the pace of transformation required by the challenge of climate change and meeting the decarbonisationobjectives. It is also a matter of advancing the establishment of socio-economic benefits. Instruments such as Law 45/2007 of 13 December 2011 on the sustainable development of the rural environment and the Economic and Social Council Report 02/2021 on a living and sustainable rural environment can be highlighted.

Participation in decision-making processes requires the opening of spaces for dialogue and consultation between the various stakeholders, with a particular impact on local communities. MITECO, building on previous initiatives, has opened a process of listening to renewables and territory which, in addition to theissues raised in Measure 1.1. The development of renewable energy compatible with biodiversity and the protection of ecosystems addresses the integration of renewable deployment in the socio-economic context of the territory, seeking proposals, tools and solutions to support their implementation for rural development.

Among the instruments that have been made available, also as a result of this open dialogue, are Article 18 (1) of Royal Decree 1183/2020 of 29 December on access to and connectionto electricity transmission and distribution networks, which provides for the possibility of launching access capacity tenders at a specific hub of the transmission network for new electricity generation

Eurobarometer. green transition needs to accelerate (europa.eu)

installationsusing renewable renewable primary energy sources and for storage facilities, in which, according to Article 19 beyond the temporal criterion, other criteria are included, such as direct jobs generated in local and adjacent municipalities; indirect employment; economic impact on the local, regional, national and Community industrial value chain; percentage of participation in the project by local investors, companies and administrations in the area.

For just transition hubs (where a coal-fired power plant is closed), the rules and notice of the first competition were published on 3 November 2021, by Order TED/1182/2021. The aim was to assess thecontraction of renewable projects to the Just Transition Strategy, in terms of employment (with a particular focus on women and surplus coal workers), training activities, promotion of self-consumption, and with a particular focus on associated business or industrial projects and local investments, among others.

On 26 November 2022, the Mudéjar 400 kV Just Transition Node was awarded for the installation of photovoltaic and wind projects, which will be accompanied by industrial, agricultural and tertiary sector projects in the territory, commitments to install self-consumption for citizens and businesses, investments in the local value chain, training for the unemployed in the area, commitments for the employment of previous coal workers and the creation of women's jobs.

Furthermore, Royal Decree-Law 8/2023 of 27 December 2020 adopting measures to address theeconomic and social challenges arising from the conflicts in Ukraine and the Middle East, as well as to mitigate the effects of the drought, included, in line with the recommendations issued by the European Commission, an amendment to the auction design contained in Law 24/2013 of 26 December 2003 on the electricity sector, incorporating non-economicaward rises that take into account other relevant aspects in the development of renewable energies, such as their contribution to resilience, environmental sustainability, innovation, the socio-economic impact of projects or other factors that promote the better integration of these energy sources into the electricity system.

Furthermore, as part of the cross-cutting objective on territorial cohesion set by the PRTR, the ERHA PERTE establishes among its priorities the selection of projects that maximise territorial cohesion, considering that the proper development of innovative renewables, storage and renewable hydrogen can have significant benefits from job creation, improved economic activity and innovation in the territories where it is developed, helping to prevent rural depopulation and achieve the objectives in the face of the demographic challenge and just transition areas.

To this end, PERTE ERHA incorporates the demographic challenge variable in the design of its various programmes, both direct management by MITECO and management by the Autonomous Communities; it has designed two specific lines: support programmes for investments in unique local clean energy projects in municipalities facing demographic challenges (DUS 5000 programme); and for energy renovation for existing buildings in municipalities facing demographic challenges (PREE 5000 programme).

b) Objectives addressed

- **Improving employment opportunities** in rural areas, reducing social exclusion, increasing equality between women and men and opportunities for young people, building community resilience.
- **Establish socio-economic benefits from the development of renewable technologies in rural and proximity areas,** so that, in those areas where renewables are installed, results are optimised for coexistence and bring benefits to other activities, local income and the advantages of the green transition particularly in the area.
- **Promote increased knowledge about the** risks, impacts of climate change and its consequences, as well as available adaptation options, so as to promote social and policy responses.
- Strengthen participation, social awareness and knowledge of renewable technologies, their contribution to curbing climate change and their contributions to rural development.
- Respect and reconcile with the natural values of the environment

c) Policy mechanisms

- Strengthened collaboration and coordination between administrations to promote renewable deployment that **promotes territorial cohesion,** maximising opportunities for local communities resulting from the transformation of the energy system.
- Development of **instruments that make it possible to set benefits in the territories**, such as the use of non-economic criteria in auctions and competitions, with a particular focus on rural areas that promote coexistence with other economic activities and the development of associated economic projects, improvements in the area's income or share of benefits related to the energy transition, such as lower energy costs for citizens and businesses. To this end, particular attention will be paid to small businesses, disadvantaged groups and opportunities for rural women. The collaboration of municipalities, industry associations and promoters will be sought.
- Encourage the participation of the local population, in the **development of renewable projects, taking into account** their needs and preferences. These mechanisms will also be geared towards identifying the needs of the rural environment, so as to ensure that the positive externalities of renewable projects, including agrivoltaics, are geared towards meeting these needs. Participation mechanisms shall be inclusive and incorporate the gender approach. They shall also take into account the environmental component.
- **Deepening rural knowledge, participation, exchange and awareness of climate**. To this end, participatory processes and multi-directional information sources will be put in place, i.e. with top-down, bottom-up and co-produced information flows. The approach may include capacity building at all levels, educational and information programmes, use of arts, participatory modelling and climate services, rural and local knowledge. These measures can facilitate awareness, increase the perception of risk intrinsic to climate change and influence social behaviours and acceptances.
- **Integration of the demographic challenge variable into aid lines** aimed at promoting the transformation of the energy system and strengthening its value chain.
- Promotion of commitments with the industrial and business sector associated with the transformation of the energy system to **enhance the generation of socio-economic opportunities** in areas of demographic challenge and just transition

d) Responsible

MITECO, IDAE, autonomous communities, local authorities and sectoral associations.

MEASURE 1.3. DEVELOPMENT OF NEW ELECTRICITY-GENERATING INSTALLATIONS USING RENEWABLE ENERGY

a) Description

Over the period 2021-2030, the installation of additional electricity generation capacity with reindeer of105 GW is planned. This will require harnessing the strengths of each of the renewable technologies that can beused.

In order to achieve this deployment, it is necessary to combine mature technologies capable of achievinghigh gene contributions while reducing the cost of energy supply for all consumers, to introduce measures that facilitate technological diversity recognising elements such as managability,system integrability or strength of generation, as well as to continue to boost technologies that have not reached their technological maturity stage in such a way as to take into account that they are not yet able to compete in terms of generation costs but could bring new potential and added value to the system in the future by diversifying technologies, energy sources and their location.

In turn, proper environmental, social and territorial integration of projects is essential, as envisaged in Measures 1.1. Development of renewable energy compatible with biodiversity and protection of eco-systemsand 1.2. Development of renewable energy compatible with the territory and rural development, and in the Strategic Environmental Study of this Plan, taking into account areas

of low biodiversity sensitivity, as well as considering the resilience and strategic autonomy of the industrial value chain as a criterion.

It is also essential for the development of new renewable electricity generation facilities to accompany the installation of the new capacity of demand management and storage systems (see Measures 1.5. Energy Storage, 1.6. Demand management and flexibility and 1.9. Development of newhydropower storage capacity) that optimise the use of networks and reduce the intermittency of production. This point is of greater importance in non-peninsular territories.

Finally, participatory citizens' projects have additional benefits given their benefits such as the increased socio-economic impact or increased social acceptance and public awarenessof renewables. It is essential to involve these new actors in order to achieve the ambitious renewable development targets that have been set.

The new objectives and obligations arising from RED III must be transposed into national legislation in the near to medium term by means of the Royal Decree transposing Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, although some of those targets had already been taken into account when the draft of this Plan was drawn up and sent to the Commission on 28 June 2023.

In addition, work is ongoing to incorporate appropriate pre-qualification or grading criteria that are objective, transparent and non-discriminatory, recognising the added value of products and promoting the development of an innovative and competitive renewable industry. In this regard, it should be noted that Law 24/2013 on the Electricity Sector was amended by Decree-Law 8/2023 to allow for non-economic award criteria up to 30 % to be considered. These criteria may relate, inter alia, to the contribution to resilience, environmental sustainability, innovation, socio-economic impact of the project or other aspects that improve the integration of renewable energy sources into the electricity system.

It should be noted that on 24 October 2023 the European Commission adopted the European Wind Power Package, which aims to boost industrial development in the sector, and was reflected in the signing of the Spanish chapter on 20 March 2024. The European solar charter to boost the photovoltaic industry was also signed in April 2024.

This is part of the Net Zero Industry Act Regulations. Initiative adopted by the European Union in June 2024 to increase manufacturing capacities in Europe for zero-emission technologies. The objectives of this regulation are to increase the competitiveness of the net zero sector, attract investment and improve access to clean technologies in the European Union to increase the resilience of the economy.

b) Objectives addressed

- Increase the deployment of renewable electricity generation in an orderly and sustained manner, boost citizen participation and foster technological development.
- Implement specific measures to enable the orderly deployment of renewables and the consolidation and strengthening of the associated industrial value chain by fostering resilience and strategic autonomy.

c) Policy mechanisms

The following mechanisms are foreseen for the development of new renewable installations:

- **Calls for auctions for the allocation of the economic renewable energy scheme**

  Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery and Royal Decree 960/2020 of 3 November 2009 regulating the economic regime for renewable energy for electricity generation installations established a remuneration framework for the generation of electricity from renewable energy sources, based on the long-term recognition of a fixed price, with the possibility of distinguishing between different nering technologiesaccording to their technical characteristics. sizes, levels of managemability, location criteria, technological maturity and those that ensure the transition to a decarbonised economy, as well as resilience criteria, in accordance with Community legislation, as well as

taking into account the specificities of citizen participation projects, such as renewable energy communities, andlarge-scale facilities and demonstration projects.

The auctions under the Economic Scheme for Renewable Energy that have been held since 2020 will continue, as will the indicative auction calendar that was updated for the period2022-2026 by Royal Decree 376/2022 of 17 May:

Minimum power volumes (MW)

		2022	2023	2024	2025	2026
Wind	Annual increase	1.500	1.500	1.500	1.500	1.500
	Cumulative since 2020	4.000	5.500	7.000	8.500	10.000
Photovoltica	Annual increase	1.800	1.800	1.800	1.800	1.800
	Cumulative since 2020	4.600	6.400	8.200	10.000	11.800
Solar Termoelectric	Annual increase		200		120	
	Cumulative since 2020	200	400	400	500	600
Biomass	Annual increase		120		120	
	Cumulative since 2020	140	260	260	380	380
Other technologies (biogas; hydraulic, tidal, etc.).	Annual increase		20		20	
	Cumulative since 2020	20	40	40	60	60

Up to the date of the update of the NECP, 4 auctions have been carried out, resulting in an allocated capacity of 6.380 MW.

- **Local participation in renewable generation projects**

In the calls for tenders issued under Royal Decree 960/2020 of 3 November, **mechanisms have been included to promote the diversity of actors and the existence of social and pative citizen projects,** with the intention of promoting both social and territorial cohesion and the just transition and taking advantage of the opportunities of the new decarbonised generation model.

In the conduct of the auctions, a quota of power has been reserved for locally distributed generation facilities. These facilities are limited in size, connected to the distribution network and have a local and community-led component in the ownership or financing of the facilities. In addition, it is located close to the centre of electric energy consumption. Since 2021, auctions under this scheme have been including a reserve for projects of limited size based on local participation and funding, while specific energy community projects have been promoted under the PRTR. Measure 1.24. Citizenship in the centre includes in more detail specific mechanisms to increase civic participation.

- **Specific programme for non-peninsular territories**

Support programmes have been designed for new renewable installations in non-mainland territories, in parallelwith those that can provide a guarantee of power, giving priority to projects that include demand management or storage systems. Measure 1.22. Unique projects and strategy for sustainable energy on islands specifically develops the strategy for sustainable energy on islands.

d) Responsible

MITECO, IDAE, the Autonomous Communities and local authorities.

MEASURE 1.4. DEVELOPMENT OF INNOVATIVE RENEWABLE ENERGY INSTALLATIONS

a) Description

Innovative renewable energy installations are renewable generation and storage facilitieswhich in some way enhance comparable state-of-the-art renewable technologies or per mirror to exploit untapped renewableresources, but which, on the other hand, present a certain degree of technological, market or financial risk compared to comparable non-innovative technologies.

The PRTR includes four cross-cutting axes, one of which is the Ecological Transition. This cross-cutting axissupports its development, inter alia, in Policy Palanca 3 'A just and inclusive energy transition', and within this Component 7 'Deployment and integration of renewable energies'. Investment actions under this component include Investment 1 'Development of innovative renewable energies, integrated into buildings and production processes'.

This investment provides for the use of investment aid lines as well as direct public investment inpilot projects to achieve a rapid activation of the mobilisation of investments that will boost the developmentof renewable energy injections needed to achieve the renewable energy penetration targets, support for technologies that are not yet fully competitive or have a high pace of deployment, as well as adequate environmental, social and productive integration ensuring the viability also in the medium and long term of renewable deployment.

These investments and economic support measures, together with the promotion of R & D & I, provide an enabling framework for various technological options, such as electricity self-consumption, energy storage, renewable electricity and thermal energy in the agricultural sector, concentrated solar power for industrial processes, air-conditioning in the residential and service sectors, hybrid renewable installations, bioenergy, geothermal energy, marine energy, innovative solutions around wind technologies such as offshore wind, and photovolty- such as agrivoltaic or floating photovoltaic, or large-scale solar thermoelectric generation with storage that is more manageable. This framework is expected to deliver at least 5 % innovative technologies in 2030, as set out in Article 1 of the new Renewable Directive (Directiva (EU) 2023/2413), with all the above mentioned technologies. This objective will be includedin the national legal order once the Royal Decree transposing Directive (EU) 2018/2001 is approved.

b) Objectives addressed

- Support for innovative sources of renewable generation technologies, including their integration into end uses.
- Establishment and consolidation of the renewable industrial value chain, especially in strategic and high value-added sectors in terms of technological innovation and testing infrastructures.

c) Policy mechanisms

The following mechanisms are foreseen:

- **Framework for innovation and technological development of renewable energy**

  This measure shall strengthen the framework for innovation and technological development of a number of renewable energy sources, and contribute to progress towards the goal of 100 % of renewable sources in energy demand. The renewable sources covered by this measure include the following sectors: Offshore wind, energy storage, biogas, green hydrogen.

- For each sector, provision is made for the following:

  - **Offshore Wind**: Implementation of the 'Roadmap for the Development of Marine Wind Wind and Marine Energy in Spain'. This Roadmap aims to reduce the administrative obstacles to the development of this renewable energy source and to achieve energy targets of between 1.000 and 3.000 MW installed for offshore wind and between 40 and 60 MW of offshore renewables. Specifically, the roadmap shall seek to: (a) boosting research, development and innovation through a more agile regulatory framework and strengthening technology centres and testing platforms for new prototypes; (b) identify

opportunities and synergies with key industrial sectors; (C) develop an appropriate regulatory framework for the deployment in Spain, especially of floating technology; and (d) identify measures to minimise environmental impacts.

This measure will implement the main regulatory measures identified in the Roadmap to promote offshore wind farms, boost research and development, and support the deployment of floating technologies. Under Measure 3.5. Promotion of regional cooperation (Framework for boosting investment in offshore wind and marine energy) has been approved by Royal Decree-150/2023 of 28, approving maritime spatial plans for the five Spanish marine districts. This standard is presented as a tool to facilitate the sustainable development of the blue economy, favouring its economic, social and environmental component. It is also closely linked to reform C7.R4 dedicated to the Renewable Energy Innovation and Technological Development Framework, and milestone CID #113 (C7.R4).

- **Energy Storage**: Development of the "Energy Storage Strategy". Within the Technological Development Palanches, the Strategy identifies the following measures: (a) Promote the creation of platforms for experimental and research laboratories; (b) Improving technology transfer; (C) Quadruple propeller initiatives; (D) harness European and national initiatives that function asPalan to boost innovative projects; (e) promoting the uptake of European funds for innovation; (f) Support measures for the development of pilot projects; (g) Stepping up R & D & I in long-term storage; (h) Strengthening research in technologies behind the meter; (I) Advanced battery research; (j) promoting R & D & I in all technologies; (K) Support for R & D & I of renewable hydrogen value chain technologies.

- **Biogas**: The R & D & I measures included in the Biogas Roadmap will promote the development of Spanish energy and environmental technology, helping to boost Spanish businesses and industries in the biogas value chain (mainly in the agro-industrial, livestock, agricultural or waste management sectors). Specifically, the roadmap shall seek to: (a) Encourage-research to assess and minimise emissions of air pollutants other than greenhouse gases; (b) facilitate studies on the prefeasibility of projects for the thermal application of biogas; (C) Fostering demonstration projects for biogas use in industry; (D) Promote the conduct of studies on the prefeasibility of projects to be carried out in waste plants and waste water treatment plants aimed at the application of biomethane in vehicles; (e) Boosting demonstration projects with local entities for direct biomethane in transport; (f) Fostering innovation in less mature technologies.

- **Floating PV**: In order to encourage the development of floating solar photovoltaic installations, witha view to the sustainable use of public water resources, the Government has approved the Royal Decree establishing the scheme for the installation of floating photovoltaic plants in the public hydraulic domain, which will determine the conditions, criteria and rules governing the procedures to be followed in order to be able to obtain administrative authorisations and concessions for the putting into service of this type of installation, which may occupy between 5 % and 15 % of the total usable area of these reservoirs. In addition,hydrographic confederacies may promote public tenders to grant authorisations and concessions in state-owned reservoirs. Concessions shall have a maximum duration of 25 years.

  The Royal Decree makes the solar installation conditional on its compatibility with the corresponding Hydrological Plan, as well as with the needs of the exploitation of each reservoir, pre-existing rights and uses, the environmental objectives of the water bodies and the environmental assessment procedure.

- **Other renewable technologies**: There are other generation technologies (e.g. solar thermoelectric with large-scale storage, deep geothermal, etc.) which, although not yet competitive, have great potential. Calls for financial support instruments will be held for these, with a reduced capacity to accommodate demonstration or *flagship* projects. Depending on the specific needs of each case, the auction could be supported by public financing.

Specific aid

- As part of the PRTR (DEMOS RENMARINAS Programme) and in line with the 'Roadmap for the Deartingof the Marine Wind and Energy of the Sea in Spain' of December 2021, Order TED/1204/2022 of 2 December 2022 was published, establishing the regulatory bases for the **programme fortransferring investment aid for pilot projects and port testing and infrastructure platforms for offshore renewables**, financed by the European Union, NextGenerationEU. By Resolution of 21 December 2022 of the Board of Directors of the Institute for Energy Diversification and Saving (IDAE), M.P. formalised the first call for this aid programme, with a budget of EUR 240 million.

MITECO has decided to grant EUR 146.9 million to 21 actions aimed at promoting twistedtesting and demonstration of new prototypes in the field of offshore renewable energy. Selected projects are estimated to mobilise investments close to EUR 384 billion.

Technologies include floating wind testing projects, followed by waves andcurrents and floating photovoltaic projects. Other projects will also include hybridisation between floating wind and wave wind. The installed capacity associated with the projects to which the aid has been granted is 55.7 MW.

- Order TED/467/2023 of 28 April 2015, financed from the PRTR funds, has been published and the first call for aid for feasibility studies for innovative projects for medium and high temperature geothermal energy under the PRTR has been approved. Managed by IDAE, it isintended for the feasibility of innovative, medium-temperature and high-temperature geothermal energy projects for electricity generation.

  IDAE has decided to award EUR 54.6 million to 7 actions aimed at boosting the development of geothermal energy, clean, manageable and infindable energy. Its use leads to less energy dependence on the outside, reduces fossil fuel consumption and strengthens the security of hisminister by providing a constant flow of energy that is not dependent on seasonal variations. Selected projects are estimated to mobilise investments in excess of EUR 110 billion.

- Order TED/1447/2021 of 22 December 2015 approving the regulatory bases for granting aid for **innovative R & D energy storage projects under the** PRTR has been published. Industrial research initiatives include the creation of complex system components or prototype construction in a laboratory environment and experimental development activities thatinvolve the development of commercially usable prototypes or pilot projects.

  IDAE has decided to award EUR 9.9 million to 6 innovative R & D projects for rimental development andindustrial research in the field of energy storage, with the aim of contributing to the technological maturity of storage.

- Order TED/706/2022 of 21 July 2015 approving the regulatory bases andincentives for granting aid to **individual projects of biogas installations under the** PRTR has been published. It is aimed at energy recovery of organic waste that boosts the circular economy. The installed capacity associated with the projects to which the aid has been granted is 188 MW.

- Order TED/1177/2022 of 29 November 2015 approving the regulatory bases for granting aid to **innovative projects for hybrid energy storage with installations for thegeneration of electricity from renewable energy sources** under the PRTR has been published. This call aims to boost the deployment of energy storage, contributing to the energy transition and, in particular, to provide new flexibility to the energy sector, hindering the integration of renewables. It is part of the PRTR Component 8 “Electricity infrastructure, promotion of smart grids and deployment of flexibility and storage”, and specifically its investment 1 (C8.I1), ‘Deployment of energy storage’.

  IDAE has decided to grant EUR 150 million to 36 innovativehybrid gene storage projects with renewable energy generation facilities. This innovative initiative boosts progress towards consolidating a renewable storage park in Spain. The installed capacity associated with the projects to which the aid has been granted is 904 MW.

- In accordance with the Guidelines on State aid for climate, environmental protectionand energy, approved by the European Commission in 2022, and following the favourable conclusion of a noti processbefore the Commission, Order TED/807/2023 of 17 July approving the regulatory bases for granting aid to **innovative energy storage projects under the PRTR, for investment in innovative energy storage projects in theirindependent modali (standalone**), connected to transmission and distribution networks, projects hybridised with electricity generation installations from renewable energy sources, reversible pumping projects and, finally, innovative thermal storage projects. These plants aretaxed on the energy transition by providing flexibility to the energy sector and thus improving the integration of renewables.

- The publication of the regulatory bases for support for innovative renewable energy, storage and heat pump projects on 25 July 2024. The line, initially endowed with EUR 250 million, willper se mitigate the deployment of innovative or value-added facilities due to their capacity to integrate into the territory and production sectors.

The aid will cover agrivoltaics, floating photovoltaic projects associated with infrastructure, collective self-consumption with the participation of vulnerable consumers, and renewable heat pump installations, with a multiple objective: deploy renewables that have a degree of innovation or addedvalue due to their ability to integrate both in the territory and in the production sectors, while boosting collective self-consumption and the deployment of the heat pump to decarbonise air conditioning.

(D) Responsible

MITECO, IDAE, in collaboration with MICIU.

MEASURE 1.5. ENERGY STORAGE

a) Description

The transition to climate neutrality is a profound transformation of the energy system with a furtherincrease in the penetration of renewable resources. In the case of the electricity sector, there is a profoundparadigm shift evolving from a centralised generation system based on a'base' and 'peak' generation with a predominantly passive demand, to a new model where it is necessary to manage the variability and partial predictability of renewable generation using tools that makethe electricity system futile. To this end, energy storage is a key technology, both because of the possibility of shifting generation to times when it is needed, and because of its ability to provide other complementary services, such as reserves.

This plan envisages the development of storage as one of the key tools for giving flexibility to theelectricity sector, as well as contributing to the management of electricity networks, the participation of citizens in changing the energy model, and greater competition and integration in the electricity market. There is a wide variety of storage technologies with different applications and characteristics that are complementary, either because of their application in the electricity sector and their relationship to the electrification of the economy, or in different end uses, such as thermal energy storage.

Electricity systems with high penetration of renewable energy have to address some of the challenges associated with their integration. These include the use of discharges and the provision of rolling or synthetic inertia. To this end, there is a wide range of energy storage technologies, many of which already have a long distance and a solid state of maturity, while others are on theway ahead in terms of technological development, with progress being made in improving their technical characteristics and performance, reducing their cost and, as a result, improving their competitiveness.

The deployment of energy storage requires a multilevel approach, and there is aneed for market developments, technical management of the energy system and the development of new business models. The development of these technologies will make it possible to exploit the potential of the management of distributed renewable energy resources, generating benefits for the system, through improved integration of renewables and grid management, which will ensure security of supply; to ensure that consumers, either individually or in aggregate, directly or through other figures, can participate in the provision of such services.

The **Energy Storage Strategy**, adopted in February 2021, already identified the main challenges for the deployment of energy storage, the measures needed for its effective deployment in a context of creating a new energy system model, with the twin goal of climate neutrality and harnessing the opportunities this shift brings. Two years later, the need to incorporate storage has been reinforced by **the Commission Recommendation of 14 March 2023 on energy storage and to support a decarbonised and secure EU energy system** (2023/C 103/01) in which, without losing the reference of the European Green Deal and the REPowerEU Plan, it is emphasised that:

- System transformation requires greater flexibility, understood as the ability of the energy system to adapt to changing grid needs and manage variability and uncertainty of demand and supply while achieving the decarbonisation objectives of the energy system.
- Different energy storage technologies (including mechanical, including hydraulic, thermal, electrical, electrochemical and chemical storage technologies) can provide different services at different scales and for different time frames and can be a

technical solution to provide stability and reliability.

- Energy storage contributes to system integration and security of supply and to this end a decarbonised energy system will require significant investments in storage capacity of all kinds.
- In the case of less interconnected or non-interconnected energy systems, such as islands, flexibility resources, in particular energy storage, can be of great help to move away from imported fossil fuels and manage high levels of short-term and seasonal variability in renewable energy supply.

b) Objectives addressed

The Storage Strategy envisages a storage capacity of around 20 GW in 2030, reaching 30 GW in 2050, considering both large-scale and distributed storage,with daily, weekly and seasonal storage technologies. The current version of the NECP **raises these forecasts to more than 22 GW in 2030, rising from daily and weekly to 12.5 GW and seasonal to 10 GW**. The precise composition and operation shall be developed in the light of technological development and availability, as well as the specific needs of the network in terms of the technical characteristics required for its operation. Both stand-alone or standalone technologies and hybrids with renewable generation are expected to be developed. In line with this, the objectives of this measure are:

- Define energy storage needs. Energy storage should meet the operational needs of the system on the basis of the scenarios set out in this Plan, and in particular as regards rapid response, daily, weekly and seasonal flexibility.
- Ensure the effective deployment of storage in accordance with the provisions laid down in this Plan and the Energy Storage Strategy. In a system with a 81 % share of renewable energies in electricity generation in 2030 and a 100 % share in 2050, flexibility will be essential to be able to operate safely.
- Strengthen and promote the national storage industry for use in all possible applications and integrate different companies in the energy value chain. The aim is to capture the maximum potential in terms of generating economic development and industrial employment resulting from the energy transition. This process must go hand in hand with the promotion of innovation and technological development and training.
- Putting citizens at the centre. The roll-out of storage behind the meter has seen a strong boost in recent years, reaching 1.6 GW operational in 2030.

c) Policy mechanisms

- **Implementation of the Energy Storage Strategy**

  The integration of renewables included in this Plan requires the installation of storage capacity to reach 22.5 GW of storage by 2030, including daily, weekly and storagetechnologies. The decrease in the costs of renewable electricity generation and storage is significantly altering the profitability assumptions of the different technologies, so the future composition of the storage technology mix will depend on technological development and the relative merits of each alternative.

  In order to ensure that the electricity system has such storage capacity, it will be analysedwhether it is necessary to establish remuneration frameworks which, taking into account the degree of maturation of the various storage technologies, complement the price signals on the energy markets and the system balance received by these installations. The design of these mechanisms shall be determined by the capacity analyses performed by the system operator over different time horizons and shall be integrated, where appropriate, into the capacity mechanisms developed in accordance with the principles laid down in the legislation on the internal electricity market.

- In order to contribute to meeting the renewable energy targets laid down by law, the use of non-fluent public water resources for electricity generation in the new concessions granted will have as a priority support for the integration of non-manageable renewable technologies into the electricity system. To this end, in particular reversible hydropower plants shall be promoted to manage renewable production, respecting a flow regime that makes it possible to comply with the environmental flows of the

affected water bodies and supporting basin regulation in extreme conditions, in a way that is compatible with efficient water resource management and environmental protection. By regulation, mechanisms may be put in place to apply to new concessions that are granted a pumping, storage and turbination strategy to maximise the integration of renewable energies, subject in any case to compliance with the environmental objectives in the river basin plans. On the other hand, the reform introduced into the water legislation by RDL 8/2023 has removed existing regulatory barriers to progress in this direction and to enhance hydraulic energy storage.

- **Recovery and Resilience Plan**

  Specifically, the PRTR's 'Just and Inclusive Energy Transition' policy includes among its objectives the deployment of storage technologies, the Energy Storage Strategy being key for its implementation.

  As part of this policy, Component 8 should be highlighted: electricity infrastructure, promotion of smart grids and deployment of flexibility and storage, endowed with EUR 1.365 billion, the main objective of which is to ensure the transformation of the energy system to ensure that it is flexible, robust and resilient so that it can be primarily based on renewables. This will be done by promoting the progressive adaptation of network infrastructures, their digitalisation and the deployment of tools that provide flexybility, such as storage, to ensure security and quality of supply.

Component 8 has 4 reforms and 3 investments, all of which are directly or indirectly linked to the deployment of energy storage. In particular, Investment 1. "Deployment of energy storage" is worth EUR 684 billion. In its implementation, the following aid programmes for energystorage have been designed:

- Royal Decree 477/2021 of 29 June 2014 on aid for the implementation of various incentive schemes forself-consumption and storage, with renewable energy sources, as well as for the introduction of renewable thermal systems in the residential sector, within the framework of the PRTR, includes among its actions the promotion of storage 'behind the meter'.

- Order TED/1447/2021 of 22 December 2015 approving the regulatory bases for granting aid for innovative R & D projects for energy storage under the PRTR. Industrialresearch NEETs include the creation of complex system components or prototype construction in a laboratory environment and experimental development activities that include the development of commercially usable prototypes or pilot projects.

  IDAE has decided to award EUR 9.9 million to 6 innovative R & D projects for rimental development andindustrial research in the field of energy storage, with the aim of contributing to the technological maturity of storage.

- Order TED/1071/2022 of 8 November establishing the regulatory bases for the programmes for granting investment aid for the repowering of wind power plants, for the technological and environmental renovation of mini-hydroelectric power of up to 10 MW and for innovative recycling installations for wind turbine blades, under the PRTR, specifically allocates EUR 20 million to the incarcerationof storage in these facilities.

- Order TED/1177/2022 of 29 November 2015 approving the regulatory bases for granting aid for innovative energy storage projects hybridised with installations for the generation of electricity from renewable energy sources under the PRTR. This call aims to boost the deployment of energy storage, contributing to the energytransition and, in particular, to provide new flexibility to the energy sector, increasing the integration of renewables.

  IDAE has decided to grant EUR 150 million to 36 innovativehybrid gene storage projects with renewable energy generation facilities. This innovative initiative boosts progress towards consolidating a renewable storage park in Spain.

  In accordance with the Guidelines on State aid for climate, protection of the environmentand energy, approved by the European Commission in 2022, and following the favourable conclusion of a notification process to the Commission, Order TED/807/2023 of 17 July approving the regulatory bases for granting aid to innovative energy storage projects under the PRTR, for investment in innovative energy storage projects in theirindependent modali (*standalone*), connected to transmission and distribution networks, projects hybridised with electricity generation installations from renewable energy

sources, reversible pumping projects and, finally, innovative thermal storage projects. These plants aretaxed on the energy transition by providing flexibility to the energy sector and thus improving the integration of renewables.

Under these regulatory bases, the calls for standalone or thermal storage have been published, *on the one hand, and* the call for storage projects for reversible pumped storage, onthe one hand.

In particular, IDAE has decided to grant EUR 100 million to 4 reversible pumped storage projects in July 2024. The beneficiaries of the aid are three projects for new reversible plants and one for using two existing reservoirs to add pumping capacity. It is estimated that these actions can increase turbination power by around 2.000 MW with an increase in storage capacity of almost 30.000 MWh.

- With regard to the call for standalone storage*and*thermal storage, it is expected to be resolved in the course of 2024. Furthermore, investment 3 from Component 8 'NEU key businessmodels in the energy transition' plans to allocate EUR 156 million to boost solutions that help to make the energy sector more flexible and increase innovation to tackle the challengesposed by the energy transition. To this end, a support programme has been launched for this purpose, governed by Order TED/1359/2022 of 28 December, the first call for applications for which was launched in June 2023.

† Operating attractions of storage facilities for the determination of the ability to access distribution networks

From 26 July to 9 September 2024, the public consultation has been launched on the CNMC'sproposal for a new initiative establishing the operating standards of storage facilities for the determination of the capacity for access to distribution networks.

These patterns would be established from both the demand and the generation perspective, with operating slots in generation and consumer mode, not including, outside the ranges, the injection or absorption of power into the network.

(D) Responsible

MITECO, Hydrographic Confederations, IDAE, CNMC, REE, Distribution System Operators (electricity and gas), Autonomous Communities and sectoral associations.

MEASURE 1.6. DEMAND MANAGEMENT AND FLEXIBILITY

a) Description

As mentioned in the previous measure, the paradigm shift in the energy sector makes it necessary to putin place mechanisms and services that give flexibility to the energy system, such as the management of demanda, complementary to the energy storage addressed in the previous measure. On the other hand, new demands arise, such as charging electric vehicles, electrification of air conditioning, production of green hydrogen, or other solutions that, due to their characteristics, can change their consumption patternto bring fle xybility to the system, which through smart management can be an additional tool facilitating demand and grid management.

In fact, increasing system flexibility is one of the actions that contributes to achieving the renewable electricity generation targets set out in this NECP. The contribution to further integration of the electricity market is addressed in Measure 4.6. Electricity market integration.

In turn, as stated in 'Measure 1.24. Citizens at the centre', in order to promote a proactive role for the CIUin decarbonisation, regulatory changes at Spanish and European level and technological development, so that citizensmove from being passive consumers to actors and producers and can also participate in demand-side management through energy efficiency systems, the provision of charging services for electric vehicles or other energy services, or the electrification of air-conditioning. This can be extended to industrial and tertiary sectors, in addition to residential sectors. Energy communities will be a tool for social acceptance

and implementation of demand management actions by citizens.

This requires regulatory, market organisation and business model developments that make it possible to harness the potential of management of distributed energy resources in general, andcommand management in particular, both for the benefit of the system to enable the integration of renewables and grid management in the best conditions of cost efficiency and security of supply, and to ensure that consumption, either individually or in aggregate, directly or through other actors, can be involved in the provision of such services.

In this regard, it should be noted that the reform of the electricity market presented by the European Commission in 2023 and published in June 2024 puts the flexibility of the energy sector at the heart of the new market. The newform includes provisions such as requiring Member States to quantify their non-fossil flexibility needs and set targets to increase it, opening up the possibility to introduce new supportschemes, with a view to demand side response and storage.

The Agency for the Cooperation of Energy Regulators (ACER) has started thepreliminary mapping of flexibility needs at European level considering a methodology to assess the flexibility needs of the electricity system. REE, in collaboration with MITECO, is working on this analysis pending the final approval of this methodology for the definition of the necessary flexibility objectives. Red Eléctrica is currently involved in the development of this methodology through the ENTSO-E Task Force National Flexibility Needs.

However, account should also be taken of the emergence of new demands which, due to the nature of the service they provide, are less likely to participate in flexibility and demand-side management mechanisms, such as the demand of data processing centres (DCs) characterised byuninterrupted overcrowding and constant demand. In this regard, the deployment of such assets should be redeployed inan orderly and strategic manner in order to contribute to the achievement of the decarbonisation objectives. To this end, both this NECP and Palanca 2 of the Artificial Intelligence Strategy53 published in May 2024 include a series of measures from the point of view of energy supply and demand to promote efficiency and optimisation in the use of renewable resources available to all production sectors. In this context, a regulatory framework that encourages and mandates the sustainable installation of PCD will be promoted.

b) Objectives addressed

- Activation and promotion of demand management in various sectors (transport, residential, industrial and tertiary);
- Promoting citizen participation in demand management; boosting the digitalisation of the energy sector.
- Analysis of the flexibility of the system: As stated above, work is under way on this analysis, pending the final approval of the corresponding methodology.

c) Policy mechanisms

- **Development of the regulatory and regulatory framework for demand management**

  It is necessary to determine the technical requirements for participation in existing and developing markets for participants offering energy from renewable sources, energy storage operators and those providing demand response services. In addition, in order to ensure that consumersare involved, it is necessary to develop the role of the aggregator, and in particular of theaggregator indepen, as well as their right to enter the electricity market without the consent of other participants. This development should address the allocation of clear roles and responsibilities for electricity undertakings and customers, allowing for fair and non-discriminatory data sharing and access, while protecting relevant information, and establishing a dispute resolution mechanism between aggregators and other market participants, including diversion liability. In this regard, Royal Decree-Law 17/2022 of 20 September creates a specific balancingproduct with the help of Commission Regulation (EU) 2017/2795 of 23 November 2017 establishing a guideline on electricity balancing.

53Artificial Intelligence Strategy, 2024

The first auction under this framework took place on 20 October 2022, with bids received from 16 suppliers, in a total of 71 blocks, with a total capacity of 699 MW. Finally, the power volume allocated in this auction was 497 MW to be provided in 2.714 hours with a marginal price of EUR 69,97/MWh. A second auction took place on 4 December 2023. It involved 19 suppliers with consumption facilities equal to or above 1 MW and allocated a total of 609 MW power with a marginal price of EUR 40,82/MW.

In June 2023, the public information procedure was carried out on the proposal for a Circular establishing the methodology and conditions for access and connection to transmission networks and the taxation of electricity demandfacilities, the purpose of which is to establish the methodology and those withaccess to and connection to the transmission and distribution systems by the demand facilities, which, under Royal Decree 1183/2020 of 29 December, are required to obtain access and connection permits to the grid in order to be able to connect to those systems.

This circular regulates the conditions to be taken into account when assessing the capacity of storage facilities to access and connect from a demand-side point of view. It promotes efficiency gains in termsof access to and connection to electricity grids, by structuring, simplifying and standardising the information to be submitted by applicants. This will ensure better processing of information, speed up the processing of applications and foster transparency for system operators and network operators. It aims to maximise the use of existing networks, optimising the use of conexion facilities, thus facilitating the rational development of networks and minimising potential environmental impacts.

On the basis of the submissions received, a new version of the Circular establishing the methodologyand conditions for access to and connection to the transmission and distribution networks of electricity demand facilities was sent to a second hearing in January 2024.

In addition, between May and June 2023, Red Eléctrica sent CNMC the final proposal on the creation of operation procedure 7.5 ‘Active demand response service’. This operation procedure was approved by CNMC Resolution of 19 October 2023 and published in the BOE of 2 November.

- **Development of the independent aggregator figure**

The independent aggregator was introduced into the sector regulation through Royal Decree-Law 23/2020 of 23 June. In February 2023, a prior public consultation took place to pleadthe regulation of this figure. This figure will be key to maximise the useof energy resources and synergies resulting from the implementation of sector integration, as well as to provide effective-demand-side response to renewable variability. This development will be supplemented by the measures contained in the Royal Decree approving the General Regulation on Supply and Procurement and laying down the conditions for the marketing, aggregation and protection of consumers of electricity, in public hearings and information from 31 July to 13 September 2024.

This Royal Decree sets out the regulatory framework for the new subjects of the electricity system and, in particular, the independent operator. The Regulation develops, in addition to the general principles of AGRE’s activity, the rights, obligations and requirements of independent aggregators, as well as the adaptation of the current regulatory framework on supply and procurement to respond to the various challenges and energy policy objectives defined at national, European and international level in recent years.

- **Boosting sector coupling**

Sector coupling, i.e. alignment with other energy uses, such as charging tric vehicles, generating heating or cooling for industrial or air-conditioning uses, hydrogen production, etc. per se,introducing managemability in electricity demand while responding to other energy uses, which allows the reduction of discharges and the use of more economical energy for certain uses.

- **Management of energy resources distributed in local markets**

See Measure 4.13. Local electricity markets.

- **Appropriate consumer options and signals**

Users who so wish should have the possibility to choose and act on their energy consumption with a contract associated with dynamic prices. This should allow them to adjust their consumption according to real time price signals that reflect the value and cost of electricity or transportation in different time periods. This will require the identification and removal of legal and administrative barriers that make it difficult for consumers to choose when to consume, store or sell self-generated electricity on the market, or to participate in all electricity markets (disproportionate administrative fees or burdens, etc.).

It is also necessary to analyse the possibility of legislative development for bilateral contracts and energy exchanges between self-consumers and consumers through platforms to encourage peer-to-peer exchange and monitor transactions.

- **Advising, promoting active clients and activating other actors involved**

Information and awareness-raising campaigns for citizens on the possibilities and options available, and thedifficulties they bring, to promote their participation in the market, responding to price signals. TAM also requires that consumers have information on their energy rights to facilitate the best decision-making on all options at their disposal.

- **Development of qualified human resources**

In line with “Measure 1.27. Training for professionals in the renewable energy sector’, training programmes for builders, developers, installers and architects will be put in place, with a view to promoting the inclusion of those elements that are necessary to implement demand management measures (home automation, inmotics, Internet of Things, Big data, bidirectional electric vehicle chargers (V2G), storage, system automation, smart meters, thermal consumption management, etc.), from the design stage of the new buildings (residential and services), and in the rehabilitation of existing ones.

- **Pilot projects on demand management and storage**

Promotion and development of pilot projects on demand management and storage, new actors that can participate in it and its implementation, inter alia, in local energy markets. The regulatory sandboxes developed under Royal Decree 568/2022 of 21 July 2007 establishing the general framework for the regulatory test bed for the promotion of research and innovation in the electricity sector will be very useful in this regard. Likewise, in order to promote this type of project, Order TED/1359/2022 of 28 December approving the regulatory bases for granting aid for projects for new business models in the energy transition under the PRTR was approved under the PRTR. The first call for applications was published in June 2023 and is expected to be terminated in 2024.

d) Responsible

MITECO, IDAE, CNMC, REE, OMIE, distribution system operators (electricity and gas), operators ofelectric vehicle charging infrastructure, autonomous communities and sectoral associations.

MEASURE 1.7. ADAPTATION OF ELECTRICITY GRIDS FOR THE INTEGRATION OF RENEWABLES

a) Description

Renewable electricity production capacity in Spain accounted for more than 59 % of the installed capacity in the entire generating fleet at the end of 2022.

The NECP provides for 81 % of electricity consumption to be covered by renewables in 2030. With the aim ofnesting renewable energy discharges, coupling electricity generation and demand, maximising grid capacity and reducingthe need for fossil-based thermal power plants as a back-up system, it is necessary to strengthen and grow transmission and distribution lines on national territory, including mainland connections, non-peninsular systems and interconnections between island systems.

b) Objectives addressed

Address the new needs of electricity grids in such a way as to enable the integration of renewables,the assumption of new players and security of supply.

c) Policy mechanisms

The large renewable generation capacity allocated by the Plan needs to be adequately accommodated inthe electricity system in a safe way for the system. To this end, the following instruments are envisaged:

- **Adaptation of plans for electricity transmission and distribution grids**

  Since the 2021-2030 NECP was drawn up, the **2021-2026electricity transmission network development plan** has been approved, which includes the infrastructure needed to ensure security of supply in the planning period to 2026. The current planning integrates renewable energy into the grid in order to promote the achievement of renewable energy targets in the medium and long term, and is adapted to the needsof demand arising from new industrial and transport activities such as railways or electrification of seaports. The estimated investments associated with the national electricity infrastructure planned for 2026 are EUR 5.704 million, with an average annual investment volume of EUR 951 million.

  This development plan has been amended by the Resolution of 22 April 2024 ofthe Energy Secretariat, publishing the Agreement of the Council of Ministers of 16 April 2024 amending specific aspects of the Electricity Transmission Network Development Plan 2021-2026. The amendments to the 2021-2026 Electricity Transmission Network Development Plan include twenty-three actions to meet new high-power demands, nine actions for storage and renewableration (four of which are in just transition hubs), three actions to cover operational needs, and thirty-eight actions to meet needs arising from the implementation of the current planning itself. The set of one-off changes represents an increase in the associated investment valuecompared to the 2026 horizon planning approved in March 2022 of EUR 489 million.

  The development of projects in the electricity transmission network with a particular impact on the internal market is specifically addressed in Measure 4.5. Electricity Transmission Network Development Plans 2021-2026 and 2025-2030 of this Plan.

  In addition, the procedure for planning the transmission network for 2030 was initiated byOrder TED/1375/2023 of 21 December, which initiated the procedure for drawing up proposals for the development of the electricity transmission network by 2030.

- **Digitalisation and management**

  The design and operation of transmission and distribution networks will face important challenges such as the existence of more distributed generation with higher levels of intermittency than today, as well as the transformation of the traditional model of unidirectional power flows from generation centres has led toa model of bi-directional and intermittent flows.

  Moreover, in order to optimise investments in a context of strong penetration of renewables and increasing electrification of the economy, the networks will need to carry out an important digitalisation process that willenable them to improve their monitoring, control and automation systems. In addition, the digitalisation of networks will allow effective demand management and the integration of new services for consumers such as smart charging systems, storage or demand aggregators.

  With a view to transforming distribution networks into more digitalised ones, Circular 6/2019 on Distribution Remuneration introduced a component that values investments in digitalisation, which are essential for flexibility services to operate, and also enable traditional grids to be converted into smart grids.

- **Recovery and Resilience Plan**

  Investment 2 of Component 8 of the PRTR, “Digitalisation of distribution networks to meet the requirements needed to implement the energy transition”, with EUR 525 billion, aims to support investment in digitalisation for distribution networks to adapt and adapt them to this transition process towards a decarbonised, distributed system with a high participation of different actors,

flexible and smart. For its implementation, Royal Decree 1125/2021, of 21 December, was approved, guiding the granting of direct subsidies to electricity distribution companies for investments in the digitalisation of electricity distribution networks and in infrastructure for charging the electric vehicle from the PRTR funds.

In turn, the addendum to the PRTR includes a new investment, C31.I4, to strengthen the development of theeléctri transport networks, with EUR 931 million.

- **Operating procedures.**

Operational procedures have been updated in recent years to include the operation of newacts in the energy system, such as storage, independent aggregators or demand management.

- **Strategy for decarbonisation of the electricity sector**

Article 34 of Law 7/2021 on climate change and energy transition empowers the government to require theoperator of the system, the transporter and the distributors to draw up and submit astrategy for decarbonisation as regards its scope of action. This report shall therefore contain the necessary adaptations in the electricity system to safely operate a fully renewable electricity system.

(D) Responsible

General State Administration (MITECO, CNMC, MCI), REE, distributors and operators of district networksand autonomous communities.

MEASURE 1.8. DEVELOPMENT OF SELF-CONSUMPTION WITH RENEWABLES AND DISTRIBUTED GENERATION

a) Description

Self-consumption with renewables makes it possible to bring generation closer to consumption and thus reduce losses, increasethe involvement of consumers in the production and management of their energy and make use of existing land. This is a tool for citizens' participation in the energy transition, in which both women and men benefit from collective self-consumption, as an opportunity to combat energy poverty and a factor of competitiveness, reducing and stabilising long-term energy costs for businesses, especially SMEs.

For this reason, the promotion of self-consumption is one of the main keys in this update of the NECP, for which a target of 19 GW of self-consumption installed by 2030 is set.

The Self-Consumption Roadmap, adopted in 2021, sets out the various policies to support and promote this mode. While the roadmap identified a potential of 9 GW by 2030, with a 'high penetration' scenario reaching 14 GW in 2030, the set of measures taken and the demand from citizens, businesses and public administrations has so far facilitated faster penetration than expected. Since 2018, when the so-called 'sun tax' came to an end, self-consumption in Spain has multiplied, rising to acumulative total of between 2.500 MW and 2.750 MW in 2021, according to the main sectoral associations. An increase of approximately 2.500 MW is estimated for 2022, bringing the cumulative total to around 5.200 MW.

This path, and the momentum shown by the various actors, allows for a more ambitious target to be set under this NECP.

b) Objectives addressed

Boosting self-consumption for decentralised generation, citizen participation and competitiveness of the economy.

c) Policy mechanisms

The Self-Consumption Roadmap will contribute to improving the competitiveness and modernisation of economic sectors by comprehensively boosting the integration of electricity generation in buildings or in the medical, industrial, tertiary and public sectors.

The Roadmap includes up to 37 measures to promote the development of self-consumption. Some of the most relevant ones are then extracted and summarised:

- **Collective self-consumption and citizen participation**

  One of the main novelties of the regulatory framework launched in 2018 is the possibility ofcolec self-consumption, so that the same generation facility can be shared by different self-consumers, creating significant opportunities in terms of economies of scale and reducing barriers to access to self-consumption. It is particularly key in areas such as multi-family housing, which corresponds to more than 70 % of main dwellings in our country. For this reason, the Roadmap dedicates a set of measuresto promote this type of facility, such as awareness-raising measures or improvements to facilitate the management of collective self-consumption.

- **Soft finance and direct investment grants**

  The PRTR has dedicated its main support instrument in the field of energy transition to self-consumption, with a budget of over EUR 2.100 billion. This push plan has been key, at times ofINCERTI such as those associated with the COVID-19 crisis and Russia's invasion of Ukraine, to maintain and accelerate the deployment of self-consumption in Spain.

  Looking ahead, soft financing mechanisms are also proposed to facilitate the mobilisation of private investment by allowing investment to be returned on the basis of the economic savings brought about by the geneof self-consumption.

- **Incentive measures at a local level.**

  Given the highly local nature of self-consumption, it is necessary to implement promotion measures from themunicipal, Autonomous Community or, where appropriate, islands, in particular the simplification of formalities (for example, simple prior notification in the case of installations in buildings not subject to financial protection) and the appropriateintegration into town planning instruments.

  The IDAE has launched measure 3 of the Self-Consumption Roadmap, setting up the working group with local authorities to coordinate the development and monitoring of best practices with local, island and regional authorities for this purpose.

  In this context, a guide has been drawn up with guidelines for municipalities to promote self-consumption, as set out in measure 4 of the Self-Consumption Roadmap, to facilitate decision-making by the municipal authorities.

- **Boosting self-consumption in vulnerable sectors**

  Boosting experiences that exploit the potential of self-consumption regulation to develop systems in which public or private self-consumers can share their surplus generation with nervable households, as well as other specific measures aimed at alleviating energy poverty. As indicated in Measure 27 of the Roadmap (Collective Social Self-Consumption), the creation of social collective self-consumption facilities for vulnerable people in energy poverty is being encouraged.

  As foreseen in the National Strategy against Energy Poverty 2019-2024 (see Measure 4.2. Plans ofDesa Rrollo of the Electricity Transmission Network 2021-2026 and 2025-2030 of this Plan), autochthonous systemscan be a tool to alleviate energy poverty. In this regard, the actions ofthe admi nistration relating to the promotion of public housing parks, access to housing or social service activities must take into account the potential of self-consumption to reduce electricity bills and the energy dependency of vulnerable families and groups. In this regard, in July, MITECO published the regulatory bases for aid for innovative renewable energy, storage and heat pump projects, in which, among others, collective self-consumption projects with the participation of vulnerableconsumers will be eligible.

  Moreover, collective self-consumption schemes and more dynamic energy management mechanisms allow public administrations or social entities to manage situations of energy poverty, not only by means of financial aid but also through the allocation of participation in self-government with groupspromoted by these public administrations or social entities, which would directly reducethe electricity bill of consumers at risk of energy poverty. Energy communities, given their primary purpose in view

of the initiatives deployed so far, will be key players in the implementation of real solutions in this area.

- **Self-consumption office**

In order to disseminate, inform and advise and within measure 7 of the Self-Consumption Roadmap, an information and advisory space has been created on the IDAE website to support consumers (individuals, shops and businesses) who wish to opt for a self-consumption facility.

This space contains information related to self-consumption (regulations, technical guides, mailbox of doubts and questions, information on bodies with competence for self-consumption in the variouscommunities, etc.).

- **Updating the rules on self-consumption and the roadmap**

As foreseen in the roadmap, the roll-out of self-consumption, wavesand barriers identified will continue to be monitored to update and adjust the regulatory framework. The roadmap itself also provides for its updating in accordance with the revision of this NECP, so as to maintain consistency in the objectives set out in both policy instruments.

d) Responsible

Autonomous Communities and local authorities, with a definition of the general framework by the General State Administration, in particular the Ministries responsible for Energy (MITECO) and Finance, as well as the IDAE.

MEASURE 1.9. DEVELOPMENT OF NEW HYDROELECTRIC STORAGE CAPACITY

a) Description

Article 7 of Law 7/2021 of 20 May 2003 on climate change and energy transition provides that, in order to meet the objectives of developing new electricity generation installations using renewable energies, the priority of new water concessions to be granted is the integration of renewable technologies into the electricity system. It specifies, in particular, the need to promote the development of reversible hydropower plants that meet the environmental objectives of water bodies and the ecological flow regimes set out in the river basin management plans and are compatible with the river basin management plans and the rights granted to third parties, with the efficient management of the resource and its environmental protection.

Reversible hydropower plants are characterised by a high ratio of the power that isenforceable to stored energy, i.e. the number of storage hours which, together with the technical characteristics of their turbine, which supplies rolling inertia, make these technologies very well performing for the integration of renewable energies. In addition, this is a mature and proven technology, which has extensive experience and expertise in Spain and has a sound value chain at national level. It is a flexible technology that is adjustable to long unloading times and can copewith certain operating regimes (hourly, daily, weekly or even seasonal). Reversible hydropower plants contribute to the flexible and safe operation of the electricity system, mainly because of their mechanical inertia – necessary to maintain the synchronism of generation units – and of their contribution to adjustment services. For all these reasons, energy storage by reversible hydropower plants – especially pumping plants – is key to the operation of an electricity system based on renewable production, and is even more relevant in the face of scenarios of higher penetration of renewable energy, such as those shown in this plan. The development of such installations will make it possible to reduce the need for fossil fuel-based plants, thus taxing progress on the energy autonomy and independence of the Spanish electricity system.

Given the potential available in existing infrastructure, the use of existing infrastructure for the development of new hydro energy storage capacity will be promoted in particular. In addition to reducing investment in new storage facilities, the use of existing infrastructure limits the associated environmental impact. In addition, under the conditions of the corresponding concession competitions, the socio-territorial development of the environment where these uses are implemented can be promoted.

b) Objectives addressed

Development of new hydroelectric energy storage capacity.

c) Policy mechanisms

The following mechanisms are foreseen for the development of new capacity for hydro energy storage:

- **Simplification of administrative processing for new reversible hydropower plants using existing reservoirs**

  In order to remove regulatory and administrative barriers that may prevent the development of new reversiblehydroelectric power centres, it was necessary to establish measures to make it possible to strengthen hydroelectric storage capacity by building on existing facilities and systems, so as to minimise the environmental impact associated with new locations. These measures have been introduced into RDL 8/2023, with the water administration (Directorate-General for Water and Hydrographic Confederations) responsible for their implementation.

- **Study of the use of hydroelectric storage in state-owned reservoirs**

  State-owned reservoirs offer an excellent opportunity to serve as a lower reservoir in new hydroelectric energy storage facilities, which would contribute to meeting the energy transition targets set. The development of new reversible hydropower plants will bestudied using state-owned reservoirs as a lower reservoir in order to set up a National EnergyHydraulic Stockpiling Programme, selecting the best uses and promoting concession competitions that establish appropriate technical, economic, environmental and socio-territorial conditions.

- **Adaptation of the electricity grid for the connection of the new storage capacity**

  The planning of the electricity transmission network includes forecasts of the need for new developments in generating installations, including hydraulic energy storage, including the provision of new and strengthening existing nodes.

- **Maintenance of ecological flow**

  The ecological flow must be maintained to ensure the natural functioning of the affected river system, taking into account both river and riverside habitats, in order to maintain the appropriate conditions for the fauna associated with them.

- **Recovery and Resilience Plan**

  Specifically, the PRTR's 'Just and Inclusive Energy Transition' policy includes among its objectives the deployment of storage technologies, the Energy Storage Strategy being key for its implementation.

  As part of this policy, Component 8 should be highlighted: electricity infrastructure, promotion of smart grids and deployment of flexibility and storage.

  Under this component, Order TED/807/2023 of 17 July was published, approving the regulatory bases for granting aid to innovative energy storage projects under the PRTR and, under that Order, the call for aid for energy storage projects for reversiblepumped-storage projects, with a total of EUR 100 million.

  IDAE decided in July 2024 to award the EUR 100 million to 4 projects. The beneficiaries of the aid are three projects for new reversible plants and one for the use of two existing reservoirs to add pumping capacity.

  It is estimated that these actions can increase turbination power by around 2.000 MW with a storagecapacity of almost 30.000 MWh.

d) Responsible

MITECO, IDAE, CNMC, REE, Autonomous Communities.

MEASURE 1.10. DECARBONISATION OF THE INDUSTRIAL SECTOR

a) Description

The introduction of renewable energy in industry contributes to progress towards decarbonising the economy and harnessing competitive energy alternatives.

Demand for final energy in the industrial sector accounted for around 23 % in 2022. This demand was met by 12 % of renewable energy sources. There is therefore a potential for both biomass and other sources of renewable thermal energy (in particular biogas, hydrogen from renewable sources and solar thermal) to contribute more significantly to the decarbonisation of the industrial sector, and must always comply with the environmental regulations in force. As regards the possibilities of self-consumption of electricity in the industrial sector, although it is being exploited intensively to date, additional potential remains. Decarbonisingindustrial processes through their electrification will entail increased demand for electricity, creating needs for new transmission and distribution infrastructure and renewable electricity generation units. When designing policy mechanisms, consideration will be given to both increasing the penetration of renewables in sub-sectors that already consume them, and diversifying industrial sub-sectors. Carbon capture, transport, storage and use (CCUS) will be taken into account in a limited way to sectors where there are no best abatement alternatives, such as those with process emissions, initially implemented in demonstration projects, also taking into account the possibilities of bioenergy with carbon capture and storage (BECCS).

The European Commission published in February 2024 the Communication “Towards an ambitious industrial management of the carbond[54] in the EU”, which identifies an EU industrial carbon management strategy as an essential complement to the mitigation of greenhouse gas (GHG) emissions to be achieved. It is also recognised that industrial carbon management technologies are part of the solution to achieveclimate neutrality by 2050. The Communication also notes that these technologies are needed to further reduce and manage carbon emissions in EU industrial processes, especially when mitigation options are limited. However, it also notes that carbon sequestration is an energy-intensive process andthat in the case of biogenic carbon it will require the sustainable sourcing of biomass.

In line with the role these technologies should play, the Net-Zero Industry Act (NZIA), supportedby Regulation (EU) 2024/1735, sets the objective for the EU to have the capacity to store 50 million tonnes of CO2 per year by geological means by 2030 and obliges oil and gas producers to contribute to this goal, recognising sector-specific knowledge in this field.

Continuing work on CCUS, the Commission publishedrevised guidance documents on 23 July 2024 to strengthen the implementation of Directive 2009/31/EC on the geological storage of carbondioxy (CCS Directive). The update aims to provide Member States with better guidance on identifying suitable geological areas for CO2 storage and adopting a balanced and risk-based approach to the financial provisions of storage permits. The main updates focus on new CO2 storage technologies in mass/ba-Baltic rocks and depleted hydrocarbon deposits, aspects of the carbon capture and storage value chain, corrosion and safety issues, and the regulatory transition from hydrocarbon production to CO2 storage. They also provide additional guidance to Member States indetermining the geological areas suitable for CO2 storage or exploration.

Furthermore, Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001 of 11 December 2018 on the promotion of the use of energy from renewable sources incorporates targets for the use of renewable energy in industry and for renewablefuels of non-biological origin, indicating that the share of renewable sources in all energy sources used for final energy and non-energy purposes in the industrial sector should be increased by an indicative increase of at least 1,6 percentage points on an annual average calculated for the periods 2021 to 2026 and 2025 to 2030. In particular, it is also noted that thecontribution of non-biological renole fuels used for final energy and non-energy purposes is at least 42 % of hydrogen used for final energy and non-energy purposes in industry by 2030, and 60 % by 2035. With this plan, in the case of Spain, it is expected to reach 74 % in 2030.

54 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Towards an ambitious Industrial Carbon Management for the EU

Progress in energy efficiency and process management in the industrial field is specifically addressed in Measures 2.6. Improvements in technology and process management systems for non-energy in tensive industriesand 2.7. Improvements in technology and process management systems for energy-intensive industries.

b) Objectives addressed

Promote the decarbonisation of the industrial sector by combining actions of various kinds, such as electrification of industrial processes, integration of renewable hydrogen and other renewable fuels, use of decentralised renewable generation and self-consumption in industry, improvement of energy efficiency and promotion of high added-value job creation.

In relation to the objectives set out in the Renewable Energy Directive, this NECP proposes to achieve an annual increase in the share of renewable energy in industry of 2 % between 2021 and 2025 and 3 % between 2026 and 2030, as well as a contribution of renewable fuels of non-biological origin to hydrogen of 74 %.

Recent developments at European level also call for consideration at national level of the role of carbon capture, cappingand use. This measure therefore also seeks to consider industrial carbon management in Spain as a potential tool to decarbonise the industrial sector in activities where there are no other emission abatement alternatives.

Under this NECP, CO2 capture is limited to sectors that are difficult to abate, such as process emissions. The deployment of carbon capture, transport, storage and use should not discourage the move away from fossil fuels. Given the high energy consumption of thistechno, decarbonisation through CCUS should take place as a last resort, subject in particular to efficiency improvements and the “first, energy efficiency” principle.

c) Policy mechanisms

For the decarbonisation of the industrial sector:

† **PERTE for the decarbonisation of industry**

The PERTE for Industrial Decarbonisation, approved in 2022, seeks to decarbonisereduction processes, improve energy efficiency, promote the use of renewable energies and promote Spain’s energy security.

The PERTE Industrial Decarbonisation comprises several public actions to supporttrial installations to develop and implement technologies to achieve a substantial reduction in greenhouse gas emissions and improve their energy efficiency, consistent with a long-term decarbonisation path. The objectives addressed are:

- Decarbonisation of production processes
- Improving energy efficiency
- Improving the competitiveness of the manufacturing sector.
- Promoting Spain’s energy security
- Promoting the use of renewable energy.
- Promoting the protection of the environment.
- Creation of high added value jobs

Within the PERTE there are 4 action lines:

- Integrated aid line for the decarbonisation of the manufacturing industry, where the lines of action include the decarbonisation of energy sources, including the electrification of processes, or the incorporation of hydrogen and the replacement of fossil fuels withrenewable fuels.

- Aid line authorised by the European Commission to manufacturing companies participating in the Important Project of Common European Interest (hereinafter IPCEI) on the industrial chain ofori gene hydrogen under the Guidelines on State aid for climate, environmental protection and energy 2022 (CEEAG).
- Study and evaluation of the development of a possible Carbon Contracts Support Fund and conduct of a possible pilot project.
- Aid line for new highly efficient and decarbonised manufacturing facilities.

The financing linked to the integrated aid line for the decarbonisation of the manu facturera industry willbe EUR 2.370 million (EUR 870 million grant and EUR 1.500 million in the form of loans). The part linked to the promotion of renewable hydrogen has a budget of EUR 450 million in subsidies. The study and evaluation of the development of a possible Carbon Contract Support Fund and possible implementation of a pilot project, if the pilot project is implemented, has a budget of 100 million in loan. Finally, financing linked to the development of highlyefficient and decarbonised facilities would consist of EUR 150 billion in grants and EUR 100 billion in loans.

► **Support programmes for the integration of renewables**

The use of direct renewables such as biomass, solar thermal or heat pumps is already a viable alternative for a significant amount of industrial uses. To this end, targeted support schemes will be encouraged. The PRTR has givena significant boost to this type of action, through the support programme for thermal renewables, regulated by Royal Decree 1124/2021 of 21 December 2003.

► **Support schemes for renewable energy, renewable hydrogen and storage**

In line with the respective roadmaps, renewable hydrogen, biogas and biomethane are keyenergy vehicles for achieving a clean, safe and affordable energy future, because they allow mitigating emissions from the use of very high temperature thermal energy, which is difficult to electrify with current technologies typical of the metal, ceramics, glass, cement and chemical industries. The support programmes included in the PERTE ERHA include support for projects for the sectoral integration of these renewable gases, which are included in Measures 1.15. Development of biogas and biomethane and 1.16. Development of renewable hydrogen.

In line with the above, it is considered necessary to promote the use of renewable fuels of non-biological origin (RFNBO) in the industrial sector.

The PERTE ERHA also covers the development and deployment of technologies and business models linked to thecore energy censorship, and in particular thermal storage, a key solution also in industrial decarbonisation.

► **Institutional capacity building**

The specific incorporation of the energy strand into policy tools in dustrial(at all levels of government) will be promoted.

► **Sectoral agreements**

Voluntary agreements will be made with certain industrial sub-sectors to enable theincrease of renewable energy.

► **Aid for carrying out energy studies, reports and audits to help industry decarbonise its processes**

These studies should identify the different technological options according to the specific process heat requirements of each industrial sub-sector (which can be based on the best available technical documentsdeveloped under Directive 2010/75/EU on industrial emissions), the physical, technical and economic potential, and identify challenges and propose measures, especially with regard to the uptake of renewable energies.

For the development of industrial carbon management, efforts will be made, taking into account the decarbonisation objectivesset out in the Plan and European regulatory developments, to align the national framework with the European context, in particular with the framework established by the Regulation of the European Parliament and of the Council establishing a framework of measures

for strengthening Europe's net-zero technology products (NZIA) manufacturing ecosystem. In particular, an assessment will be made of the need forfurther clarification and regulation, which requires an analysis of the current situation, both national and international. To this end, it is necessary to take into account the fact that technology and regulation on industrial carbon management is currently in an emerging state, in particular as regards the potential for using turned CO_2 capin different processes, especially those using petroleum products as a raw material. For example, in the chemical industry, captured CO_2 could be used as feedstock to replace fossil-based ones in the manufacture of polymers, plastics, solvents, paints, detergents, cosmetics and pharmaceuticalproducts, among others. Moreover, the uptake of renewable hydrogen will incentivise the use of CO_2 for the production of synthetic fuels to mitigate emissions in hard-to-electrify transport. In any case, the use of captured CO_2 should be matched with the availability of mature technologies, their deployment at industrial level, as well as assessing transport and storage needs and appropriate economic signals.

Industrial carbon management should also deliver real and measurable benefits for citizens, the environment and climate and result from an inclusive, scientifically informed, transparent debate on all available options and involving all stakeholders, public authorities, economic sectors and civil society.

In the light of the above, dialogues with all these actors will be launched in order to advance the definition and quantification of the development needs of these technologies.

(D) Responsible

MITECO, IDAE, Ministry of Industry and Tourism (MINTUR), Autonomous Communities and sectoral associations.

MEASURE 1.11. FRAMEWORK FOR THE DEVELOPMENT OF RENEWABLE THERMAL ENERGY

a) Description

Energy consumption for thermal uses in 2 019 in Spain accounted for around 35 % of total final energy consumption. In that same year, the contribution of renewables to energy consumption for heating and cooling purposes stood at around 16.7 %. In order to achieve the objectives of this Plan, it will be necessary to double this contribution in 2030.

The revision of the Renewable Energy Directive requires Member States to take the necessary measures to increase annually the share of renewable energy in heating and cooling consumption by 0.8 % by 2026 and by 1.1 % from 2026 to 2030 from to 2020, starting from the value achieved in, which will be included in the nationallegal system once the Royal Decree transposing Directive (EU) 2018/2001 is approved. The path of thermal renewables provided for in this Plan makes it possible to achieve this indicative target more than. In this regard, renewable energy communities can play a veryimportant role in achieving this goal. This is shown by the fact that around 40 % of the energy communityprojects in the first two calls of the EC programme implemented technologies other than photovoltaic self-consumption. Similarly, those energy communities, in a large number of cases, showed a commitment in their statutes to decarbonisation not limited to the electricity sector.

The European Commission's REPowerEU Plan sets out a number of measures, including the accelerated deployment of renewables to replace fossil fuels in the different sectors of the economy, including the residential sector. It was also included in the Energy Security + Plan, approved by the Minis tros Council on11 October 2022, setting out measures to accelerate the energy transition and enable the replacement of natural gas and other fossil fuels with renewable energy sources, in the longer term, accelerating thereduction of dependence on fossil fuels.

b) Objectives addressed

Promoting the penetration of renewable energy sources for thermal uses, in particular in the building sector.

c) Policy mechanisms

The following mechanisms are foreseen to promote the development of renewable thermal energy:

† **Specific mechanisms related to the building sector, in whose development the Ministry of Housing and Urban Agenda (MIVAU) plays a key role**

- **Integration of renewable thermal energy into buildings**

  In order to make progress on this measure, the update of the Regulation on the installation ofthermal installations in buildings (RITE) entered into force on 1 July 2021, with the publication of Royal Decree 178/2021 of 23 March amending Royal Decree 1027/2007 of 20 July, which created it.

  This Phase I update of RITE set out the energy efficiency and safety requirements that thermal installations in buildings must meet in order to contribute to achieving the climate targets set out in the National Energy and Climate Plan 2021-2030 (NECP), namely the objective of improving energyscience by reducing primary energy consumption by 39.5 % in 2030 and final energy consumption by 36.809,3 ktoe.

  In this regard, RITE partially transposes the Community directives on energy efficiency and renewable energies – in particular Directive (EU) 2018/844, Directive (EU) 2018/2002 and Directive (EU) 2018/2001 – and introduces several amendments to the legislation for the installation of thermal systems in buildings, which must be designed under the use of efficient systems to enable gene recoveryand the use of renewable energy and waste energy.

  With regard to the Technical Building Code (CTE), the new CTE was approved in 2019 by the publication of Royal Decree 732/2019 of 20 December, which substantially amended, inter alia, theBasic Docu mento DB.HE 'Energy Savings' to bring them into line with the minimum energy performance requirements laid down in the Energy Performance of Buildings Directive. The main changes made in thisrespect were as follows: boosting the use of renewable energy by reducing the previously existing limit value for non-renewable primary energy consumption, limiting total primary energy consumption andlimiting the mandatory minimum renewable energy contribution to produce DHW without priority to any specific renewable technology, among others.

  In 2022, another amendment to the CTE was published in accordance with Royal Decree 450/2022 of 14 June, which in

princi pio doesnot affect renewable thermal energy directly, but may favour its use by extending the areafor the application of electricity generation obligations to residential buildings and allowing the area occupied by solar thermal panels to be considered for compliance with the requirement.

However, it will be necessary to revise and increase the energy efficiency and renewable energy requirements of the ETC and RITE in phase II, for all new buildings and renovations, including more technical modifications and digitalisation targets, in addition to those relating to renewable energy and energy efficiency.

- **Aid programmes (loans and grants)**

In this area, Royal Decree 477/2021 of 29 June 2015 approved the direct grant to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementation of various incentive programmes, one of which is aimed at the introduction of renewable thermal systems in the residential sector.

In addition to the previous Decree, Royal Decree 1124/2021 was published in December 2021, approving the direct award to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementationof incentive programmes for the deployment of renewable thermal energy installations in different sectors of the economy. This programme, which was in force until 31 July 2024, had an initial allocation of EUR 150 million, which could be extended to twice its amount depending on the degree of progress made. This budget has been distributed among the various Autonomous Communities and cities, which are responsiblefor the publication and management of calls for aid, and will be financed from the PRTR funds.

There is a need to continue with support lines for building installations, depending on the characteristics, trendshare and costs of each technology, as well as the potential to improve the carbon footprint. In particular, specific lines shall be created for:

- Accelerate the large-scale deployment and integration of renewable thermal technologies across all sectors of the economy (ambient and geothermal heat pumps, concentrated and unconcentrated solar thermal, direct use geothermal or biomass)
- The renovation of the installed solar thermal park
- Highly efficient ambient energy equipment replacing obsolete systems
- Refurbishment of biomass equipment for high-performance equipment
- Hybridisation of renewable technologies to achieve nearly zero-energy buildings.

Consideration will be given to the specific processing of support for small installations, designing symplilines through the installer or marketing of the equipment.

In addition, the Ministry of Finance will analyse the advantages and feasibility of a possible adjustment to the tax framework so as to establish incentives to encourage electrification and the use of renewables for thermal needs, as well as to avoid the indirect subsidising of fossil fuels.

- Integration of thermal renewables through thermal storage solutions

To boost such solutions, specific support is foreseen under the PRTR Component 8, Inver 1 “Deployment of Energy Storage”. To this end, Order TED/807/2023 of 17 July 2015 approving the regulatory bases for granting aid to innovative energy storage projects under the Recovery, Transformation and Resilience Plan, as well as the newsolution approving the first call for aid for

innovative independent electricity storage and thermal storage projects, has been approved.

- The aid scheme for thermal storage is covered by Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, applying the block exemption for aid for environmental protection (Section 7). Commission Regulation (EU) No 651/2014 of 17 June 2014 provides that aid for projects for the protection of the environment shall be compatible with the internal market provided that it fulfils the conditions laid down in Article 41 thereof, and as provided for in Article 21 of Law 7/2021, territorial and urban planning and management, as well as interventions in the urban environment, buildings and transport infrastructure, with a view to adapting them to the effects of climate change, shall aim, among other objectives, to take into account, in the design, remodelling and management of mitigation of the so-called 'heat island' effect, avoiding the dispersion into the atmosphere of residual energy generated in urban infrastructure and its use on the same and surface buildings as renewable energy sources.

(D) Responsible

General State Administration (MITECO, Ministry of Finance and MIVAU); autonomous Communities andLocal Communities.

MEASURE 1.12. ADVANCED BIOFUELS AND OTHER RENEWABLE FUELS IN TRANSPORT

a) Description

Transport contributes significantly to GHG emissions, the activity being the largest (30.8 % of the total in 2022, according to the National Atmosphere Emissions Inventory). It is therefore a key sector in the decarbonisation process.

As part of the European Commission's Fit for 55 package, Directive (EU) 2023/2413 of theEuropean Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001 on the promotion of the use of renewable energy (RED III) sets an overall target to be achieved by 2030 with a focus on a 14.5 % reductionin the greenhouse gas intensity of energy supplied in the transport sector or a share of renewable energy in final energy consumption in transport of at least 29 %. For the sector specific sub-targets, abinding combat target is set in the share of renewable energy supplied to the transport sector in 2030 of 5.5 % for advanced biofuels and renewable fuels of non-biological origin (RFNBO, mainly renewable hydrogen and hydrogen-based synthetic fuels). Within this target, there is a minimum requirement of 1 % RFNBO in the share of renewable energy supplied to the transport sector.

The achievement of these targets, and consequently the decarbonisation of transport, will be achieved by reducing consumption, for example by encouraging modal shift and the use of collective public transport, and with the contribution of different technologies, mainly biofuels and renewable electricity.

Both the modal shift, especially in the area of urban and metropolitan mobility, and the electrification of transport, understood in terms of the vehicle fleet and also charging infrastructure,are detailed in the Energy Efficiency section of this Plan, so this measure focuses on biofuels and RFNBO.

In certain segments of the transport sector, such as heavy goods vehicles, which account for a quarter of that of road transport, non-electrified rail, maritime and aviation will continue to be one of the means of reducing the use of fossil fuels in the coming years.

RFNBO are fuels produced from renewable sources of non-biological origin, such as renewable hydrogen or so-called hydrogen carriers such as methanol or ammonia. These fuels have an important role to play in the medium and long term in certain modes of transport, such as maritime and heavy road transport, and are considered in the Renewable Directive.

Meeting the targets for the consumption of advanced biofuels requires a specific drive to reduce them, which is still very low. This is due, in some cases, to the limited availability of some of theraw materials considered and, in others, to the low level of technological

readiness of some of the processes enabling the manufacture of such biofuels.

In this regard, it will be necessary to transpose Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 adapting the targets for the sale or consumption of biofuels and other renewable transport fuels, as well as the specific sub-targets for advanced biofuels or renewable fuels of non-biological origin planned for 2030. In advance of this transposition, Order TED/728/2024 of 15 July 2006 implementing the mechanism for the promotion of biofuels and otherrenewable fuels for transport purposes updates the system for promoting biofuels and other renewable fuels to cover all types of energy from renewable sources supplied to the transplant,including, in addition to traditional biofuels and biomass fuels, renewable fuels of non-biological origin, which may be counted towards meeting the targets. In addition, with a view to strengthening the forecasts to prevent fraud in the biofuels and other renewable fuels sector, the order provides for actions that complement those established so far.

The actions considered in this measure concern both biofuels and biogas, including biomethane, used in transport. Examples of the biofuels concerned include pure, hydrotreatedvegetable aceti (HVO), hydroprocessed esters and fatty acids (HEFA), biodiesel, biodimethylether (DME), biomethanol and bioethanol and their derivatives, bioLPG, etc. However, given that biogas and biomethane, as well as other renewable gases such as bioLPG, have other uses in addition to their use in transport, actionsaimed at increasing the production of biogas and biomethane are generally described in 'Measure 1.15 Development of biogas and biomethane'. This includes actions aimed at boosting biogas and biomethane consumption specifically in the transport sector.

b) Objectives addressed

- Penetration of advanced biofuels and RFNBO in the transport sector
- Strengthening control of compliance with biofuel incorporation targets and the prosecution of fraud by some suppliers in the transport sector

c) Policy mechanisms

The following mechanisms are foreseen in this area:

- General obligation to sell or consume biofuels including sub-targets for advanced biofuels.
- Promoting the participation of renewable fuels of non-biological origin in transport (e.g. renewable hydrogen)
- Update of the certification scheme and biofuel sales or consumption targets to specifically collect advanced biofuels, and in particular biomethane, to align with the new regulatory framework stemming from the Fit for 55 package.
- Establishment through Royal Decree 376/2022 of a specific obligation for the sale or consumption of advanced biofuels for the period 2021-2030.
- Limitation of biofuels produced from food and feed crops.
- Setting a pathway for limiting the use of high indirect land-use change-risk biofuels or biomass fuels and their maximum share, for the purpose of the biofuel sales or consumption target.
- Promotion of the consumption of labelled biofuel blends, through measures enabling this possibility to be made available at service stations.
- Integration of the national sustainability assurance system into the DataBase Union (DERII) in order to ensure the traceability of the sustainability of biofuels.
- Promoting international cooperation to share best practices.
- Long-term policy development for a stable biofuel industry.

d) Responsible

MITECO.

MEASURE 1.13. DECARBONISATION OF THE MARITIME TRANSPORT

a) Description

Maritime transport is a key element in the global economy through its influence on international freight transport and supply chains. It accounts for 75 % of external trade and 31 % for intra-EU trade, in terms of volume. This accounts for 11 % of CO2 emissions$_{from}$ transport and between 3 % and 4 % of total EU emissions, as set out in the Commission Communication of 9 December 2020 entitled 'Sustainable and Smart Mobility Strategy: putting European transport on track for the future"55. According tothe International Energy Agency56, in 2021 international shipping contributed approximately 2 % of global CO_2 emissions.

At national level, according to the Spanish Transport and Logistics Observatory (OTLE), out of the 513.7 million nearlsthat were transported in 2022 from the ports of the Port State Ownership System, 88 % were for external navigation.

The decarbonisation process in this sector has many specificities, as it is a sector with very specific technological challenges and characteristics, including the long development and life cycles of ships, the considerable investment they require in refuelling equipment and infrastructure, andinternational competition, which require differentiated treatment. The sector is currently almost entirely dependent on fossil-based energy sources, making its progressive decarbonisation key in the energy transition.

The International Maritime Organisation adopted in 2018 a Strategy on the reduction of greenhouse gas emissions from ships57 – updated in 2023 – which sets a target of reducing carbon intensity in international shipping by at least 40 % by 2030 compared to 2008 and reaching the peak of emissions from international maritime transport as soon as possible and net zero emissions around 2050, as well as a reduction in total emissions of at least 20 % in 2030 and 70 % in 2040 compared to 2008, striving to reach 30 % and 80 % respectively.

The Fit for 55 Package includes several proposals to advance the decarbonisation of maritime transport, including:

- Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC (known as the FuelEU Maritime Regulation), with the aim of increasing the uptake of sustainable fuels by ships to reduce their environmental footprint. The standard includes an annual average greenhouse gas intensity reduction target for energy used in ships of 2 % by 2025, 6 % by 2030 and a 80 % reduction by 2050 compared to the baseline, as well as the obligation to connect to the port electricity grid, among other obligations.
- Progressive inclusion of emissions from maritime transport in the EU Emissions Trading System since 2024.
- Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU. The regulation includes a target of at least 90 % of port calls, container ships, high-speed passenger craft, passenger ships and ro-ro ships having access to OPS.
- Proposal for a Council directive restructuring the Union framework for the taxation of energy products and electricity.

Meeting the targets set out in this new European regulatory framework requires a boost to the deployment of electrification in ports in this sector, as well as the deployment of fuels of renova origin, both of biological origin (advanced biofuels, biogas) and of non-

55 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Sustainable and Smart Mobility Strategy: putting European transport on track for the future

56 IEA (2022), International Shipping, IEA, Paris

57 2023 IMO Strategy on Reduction of GHG Emissions from Ships

biological origin (renewable hydrogen).

Recently, Order TED/728/2024 of 15 July was approved, developing the mechanism for promoting biofuels and other renewable fuels for transport purposes, includingaviation and shipping sec, as well as biogas, hydrogen and other renewable fuels of non-biological origin, in the calculation towards the 2030 targets.

b) Objectives addressed

Penetration of renewable energy in maritime transport, both in port infrastructure and in ships, for a decarbonisation of the maritime sector with the lowest carbon, social and economic leakage impact.

c) Policy mechanisms

The following mechanisms are foreseen in this area:

- **Strategic framework of the port system of general interest:** This document, approved in 2022, sets the course for the transformation of Spanish ports for 2030: more sustainable, connected and innovative; addressing issues such as the climate emergency, the digital transformation or the emergence of the economy 4.0. The scope and content of the Strategic Framework has been designed in coherence with the 'Safe, Sustainable and Connected Mobility Strategy 2030', which is partly implemented through the Sustainability Strategy and Agenda 2030.
- Implementation of the obligations stemming from Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport, in particular those aiming to promote the achievement of the targets for renewable fuels in maritime transport.
- Implementation due to the new requirements of Annex VI of the International Maritime Organisation Convention for the Prevention of Pollution from Ships (MARPOL) ratified by Spain. Among the new requirements, the calculation of an Energy Efficiency Index (EEDI) and a ship's energy efficiency management plan (SEEMP) are requested.
- **Strategic planning instruments of the Directorate-General for Merchant Shipping:** Development and implementation of a National Action Plan for the decarbonisation of maritime transport and of Spain's Maritime Strategy 2024-2050, both under preparation, for compliance with the obligations of Regulation (EU) 2023/1805 and the MARPOL Convention.
- In March 2022, 'PERTE for the shipbuilding industry' was approved, which will boost transformative projects in the shipbuilding sector's value chain. This PERTE has synergies with the 'PERTE for Renewable Energy, Renewable Hydrogen and Storage' (PERTE EHRA) and includes instruments related to port facility adaptations and hydrogen mobility in the maritime sector.
- Law 7/2021 of 20 May 2007 on climate change and energy transition addresses the reduction of emissions in the maritime transport sector through the integration of renewable energy and the setting of targets for the supply of biofuels and other renewable fuels of non-biological origin. It also sets out the need to take measures to reduce emissions from fossil fuel consumption in maritime transport and in ports, so that by 2050 all those under the State's remit will produce zero direct emissions.
- **Penetration of advanced biofuels in the short term**
- Development of emerging technologies such as renewable fuels based on hydrogen, ammonia, methanol, bioLPG, synthetic fuels or AIP propulsion systems. The application of renewable hydrogen for maritime transport shall cover not only the use of fuel cells in vessels, but also machinery used in ports and freight terminals.
- Promotion of public-private partnerships aimed at the exchange of information and knowledge between all actors, regulatory monitoring at international, European and national level, joint technological development and the creation of alliances for the decarbonisation of the sector.
- Economic incentives to encourage the development of port infrastructure for the supply of electricity – especially of renewable origin – to ships at berth and other (nearly) zero emission energy sources, as well as their use by ships, including possible

bonuses on port charges, electricity charges, etc.

- These decarbonisation developments should be developed in such a way as to ensure that they will not affect protected areas, species and habitats (both the introduction of alternative fuels or energy sources, and the development of new infrastructure and associated discharges).

d) Responsible

MITRAMS, Puertos del Estado and MITECO.

MEASURE 1.14. DECARBONISATION OF AIR TRANSPORT

a) Description

The aviation sector plays a crucial role in the connectivity of countries while representing a key technical sectorfor economic development due to its role in tourism and trade, and collaboration with international bodies is important.

Greenhouse gas emissions from the aviation sector have been increasing annually since the 90s with a significant decrease in 2020 and beyond due to COVID-19. In this context,the resurgence of international air mobility is expected to be rapid, with the International Civil Aviation Organisation (ICAO) estimating a year-on-year growth of 3 % in European air traffic by 2050 for passenger transport and 2.4 % for freight.

As the development of propulsion technologies and alternative aircraft (e.g. electric aircraft) has not yet matured enough to be available for commercial operations in the near future, Sustainable Aviation Fuel (SAF) is considered to have the greatest potential to deliver short-term emission reductions, with many technological routes for their production. RFNBOs, and especially renewable hydrogen, are a very promising decarbonisation alternative in the medium and long term, with the application of renewable hydrogen for the manufacturing of synthetic fuels being particularly relevant. The alternative of biokerosene can also be highlighted. The gradual introduction of FAF in air transport will represent an additional cost for airlines and ultimately for passengers, because their production has higher costs than fossil fuels.

The electrification of transport is detailed in the Energy Efficiency section of this Plan, so this measure focuses on advanced biofuels.

Article 13 of Law 7/2021 of 20 May on climate change and energy transition states that the necessary measures shall be adopted to achieve the objectives of integrating renewable energy and supplying alternative fuels in transport, with particular emphasis on advanced biofuels and other renewable fuels of non-biological origin in air transport, including synthetic fuels manufactured using exclusively raw materials and energy of renewable origin.

The Fit for 55 package included several proposals to reduce emissions from the transport sector. In the case of aviation, the strengthening of the EU Emissions Trading System and the use ofnative alter fuels in aviation, and the deployment of infrastructure for the supply of such alternative fuels and electricity for stationary aircraft.

To promote the uptake of the production and use of such fuels, the Commission presented the ReFuelEU Aviation Sustainable Air Transport Initiative. The new standard – Regulation (EU) 2023/2405 ona level-playing field for sustainable air transport –obliges fuel suppliers to supply an increasing share of sustainable fuels as part of the fuel supplied at EU airports. The rule also aims to prevent-fragmentation of the air transport market, prevent potential distortions of competition between economic operators and unfair cost-avoidance practices in refuelling aircraft operators by charging more fuel than necessary for the safe operation of a flight at airports where it is cheaper.

Progress in the penetration of FAS consumption requires a specific boost in its production, which is still very low. This is due, in some cases, to the limited availability of some of the feedstocks concerned and, in others, to the low level of technological readiness

of some of the processes enabling the production of such sustainable fuels, which implies a price differential with conventional fossil fuel. The mecanisproposed in this section aim to reduce the price difference between SAF and conventional aviation in the future.

Recently, Order TED/728/2024 of 15 July was approved, developing the mechanism for promoting biofuels and other renewable fuels for transport purposes, includingaviation and shipping sec, as well as biogas, hydrogen and other renewable fuels of non-biological origin, in the calculation towards the 2030 targets.

b) Objectives addressed

Penetration of renewable energy in the air transport sector, both in aircraft and in airport infrastructure.

c) Policy mechanisms

The following mechanisms are foreseen in this area:

- Implementation of the obligations stemming from Regulation (EU) 2023/2405 on ensuring a level playing field for sustainable air transport and the support mechanism for the use of sustainable aviation fuels and other non-fossil aviation fuels set out in Article 3(6) of Directive 2003/87/EC.
- Transposition of the sanctions regime applicable in the event of non-compliance with Regulation (EU) 2023/2405 of the European Parliament and of the Council of 18 October 2023 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation), with a rule with the status of law.
- Integration of FAS as eligible fuel for the purposes of the obligation to sell or consume biofuels.
- Aid programme for SAF production facilities.
- Promotion of the consumption of labelled blends of renewable or sustainable fuels, through measures enabling this possibility to be made available in aviation supply centres and adaptation of the certification system to specifically collect FAS.
- Implementation of the PRTR measures, on supporting the deployment of alternative fuels at airports and on sustainability of air transport, as well as the objective of the PERTE Aerospace to train industry in aeronautical cero-emission technologies and systems.
- Implement the measures of the Hydrogen Roadmap related to the aviation sector, such as encouraging the development of production plants for synthetic kerosene produced from renewable hydrogen, analysing the redesign of aircraft to use hydrogen, setting requirements in the contracts of handling agents providing services at airports, or assessing the potential of hydrogen turbines for use in air transport.

d) Responsible

MITECO and MITRAMS.

MEASURE 1.15. DEVELOPMENT OF BIOGAS AND BIOMETHANE

a) Description

Renewable gases are part of the set of solutions to decarbonise the economy in certain difficult electrification uses such as energy demand in high-temperature industrial processes or heavy transport.

These renewable gases include biogas, mainly produced by anaerobic digestion of organic matter, derived preferably from waste

from different sources and mostly composed of targets. Biogas can also be obtained by gasification of biomass or capturing biomass in landfills. Biogas from waste is the renewable gas that takes precedence in the short and medium term, in terms of technological development, available potential and production costs. After enrichment to biomethane, it can have the same consumer uses and users and use the same infrastructure as natural gas, allowing the immediate displacement of natural gas through an alternative of renewable origin. This demand, usually linkedto thermal uses in industry, which is difficult to decarbonise with other renewable energies, is particularly interesting for carbonising. In addition, its production and use is linked to waste management and the circular economy, creating jobs in rural areas, thus contributing to the structure of the territory. In the latter respect, bioLPG obtained in biorefineries by treating biomass as a co-product in the production of biofuels for transport can also be mentioned as renewable gases.

Biogas, in terms of GHG emission reductions, achieves not only the use of a 100 % renewable fuel[58], but also an additional reduction in non-energy emissions (mainly CH4), associated with better management of municipal waste, sewage sludge and agricultural and livestock waste as well as from the agri-food industry. It is particularly important to ensure that the conditions for the production, transport and use of biogas/biomethane ensure that there are no leaks.

The use of biogas in Spain is far below the existing potential and far removed from that obtained in other EU countries. Various sources estimate a high potential available in Spain, which would be the third or fourth EU country, but our country has only around 200 biogas plants and less than a decade of biomethane.

In implementation of the current NECP 2021-2030, as well as Law 7/2021 of 20 May on climate change andenergy procurement, in March 2022 the Spanish Government adopted a Biogas Roadmap, which lays down a series of regulatory and sectoral measures, among others, for the deployment of this energy in Spain and which provides for minimum targets for 2 030 in line with the current NECP. This roadmap focuses on biogas produced by anaerobicmanagement of various residual raw materials from different origins, giving priority to their direct use based on technical, environmental and economic criteria.

Subsequently, the Communication of the European Commission (REPowerEU Plan) of 18 May 2022, aiming to rapidlyreduce the EU's dependence on Russian fossil fuels by accelerating the clean energy transition, highlighted the important role that biomethane can play in this regard as anative alter to fossil-based natural gas and has set an ambitious indicative 2030 biomethane production target of 35 bcm per year across the EU, accounting for approximately 8.5 % of annual natural gas demand in the EU.

More recently, the Regulation on methane emissions reduction in the energy sector has provided a new incentive to reduce methane emissions, which will be implemented through actions that stronglyencourage the application of decarbonised sources. Furthermore, the Directive on common rules for the internal markets in renewable and natural gases and in hydrogen articulates provisions for biomethane, including the possibility of prioritising the connection of biomethane production facilities, creating a new incentive for the sector.

Furthermore, the recently adopted Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 (DERIII) recognises the contribution of biogas and biomethane to the sales or consumption targets for biofuels and other renewable fuels in transport, as well as to the specific sub-targets for advanced biofuels planned for 2030.

At national level, recently, Order TED/728/2024 of 15 July was approved, laying downthe mechanism for promoting biofuels and other renewable fuels for transport purposes, which includes the aviation and shipping sectors, as well as biogas, hydrogen and othernon-biological renova fuels, in the calculation towards the 2030 targets. This Order therefore provides the channels for the recognition of biogas and biomethane in the transport sector in line with the provisions of the aforementioned Directive,starting from the issuance of the necessary guarantees of origin for renewable gases complemented by information on their sustainability and emission reduction achieved.

b) Objectives addressed

58 Biogas (CH_4+ CO_2+ other traces) is obtained from anaerobic digestion of the biodegradable fraction of livestock waste, sewage sludge, etc.

- Promoting biogas production and consumption and supplementing the upgrading to biomethane.
- In application of the EAD of the updated NECP 2023-2030, efforts will be made to minimise the risks of GHG leakage or indirect emissions of polluting gases into the air in the production and distribution of biomethane and biogas.

c) Policy mechanisms

- Simplify and coordinate between different Autonomous Communities the processing and authorisation of biogas and biomethane production plants and other infrastructures associated with their consumption or injection into the existing gas network.
- Clarify the applicable regulations (energy, environmental, agricultural, industrial, waste treatment, land use, spatial planning and water management) in the different territorial areas (European, national, regional and local).
- Facilitate and streamline existing gas grid connection procedures.
- Incorporating biomethane into the biofuel promotion mechanism (SICBIOS)
- Promotion of biogas projects under the PRTR, in particular in just transition areas.
- Adaptation of the system of guarantees of origin for renewable gases to the provisions laid down in recent European legislation, as well as of the associated register of installations and producers.
- Develop a greenhouse gas savings calculator
- Develop Component 3 of the PRTR through Royal Decree 948/2021, which already promotes biogas projects on agricultural holdings.
- Review and update of the Biogas Roadmap and its 3-year targets for adaptation to the new international and European energy and geopolitical environment.
- In April 2024, the prior public consultation of the Order laying down the regulatory bases for calls for aid for individual projects for biogas and biomethane installations was carried out in the framework of the recovery, transformation and resilience plan financed by the European Union-NEXT GENERATION EU. The initiative aims to boost biogas and biomethane projects in Spain with the objectives of complying with the measures set out in the Biogas Roadmap adopted in March 2022, contributing to the increase in biogas and biomethane production envisaged in the NECP, as well as contributing to the achievement of the ENGLEMENTING DISSION (CID) 117 target of investment 1 of component 7 of installing at least 3.800 MW of renewable generation by the first half of 2026.

  It is also intended to contribute to the implementation of the Transformation and Resilience Recovery and Resilience Plan and/or the Multi-RegionalOperational Plan for ERDF funds for the period 2021-2027, taking into account the related European and national legislation, by mobilising funds from the Recovery and SecurityFacility financed by that plan.

d) Responsible

General State Administration (MITECO, IDAE, MAPA); Autonomous Communities and local authorities.

MEASURE 1.16. DEVELOPMENT OF RENEWABLE HYDROGEN

a) Description

Renewable hydrogen (also known as green hydrogen) is a gas produced mainly from a water electrolysis process using electricity of renewable origin. This renewable gasis a medium to long-term solution in the decarbonisation of sectors that are difficult to electrify, such as high-temperature intensive industry or long-distance heavy transport. Moreover, its status as an energy carrier gives it great potential as an instrument for energy storage andsectoral integration.

Hydrogen is not in free state in nature, but is combined in various moleculessuch as water or hydrocarbons. Hydrogen produced from fossil sources such as natural gas (hidry grey) has been consumed mainly by certain industries such as petrochemicals and fertilisers.

One of the most relevant issues for the competitiveness of renewable hydrogen versus grey hydrogen is its production cost, which is mainly determined by the cost of renewable electricity consumed for electrolysis. In this respect, those countries with a better renewable resource have a comparative advantage when it comes to becoming producers of renewable hydrogen, as is the case in Spain.

Thus, in implementation of the current PNIEC 2021-2030 and Law 7/2021 of 20 May on climate change and energy transition, in October 2020 the Spanish Government approved the Hydrogen Roadmap: a commitment to renewable hydrogen, with forecasts for the production and consumption of renewable hydrogen in Spain for 2030 and 2050. To this end, the Roadmap itself defines a set of 60regulatory and sectoral measures for the deployment of this energy carrier in Spain, ultimately forming a country project whereby Spain becomes a hydrogen producing power through the development of a national industry covering the entire value chain.

Green hydrogen is one of the solutions for the energy transition driven by the Spanish Government's Transformation and Resilience Recovery Plan, and in particular through PERTE ERHA. The role of renewablegene hydro in the coming years is set out in the Directive of the European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen, which articulates provisions for hydrogen, which establishes an ad hoc regulatory framework for this energy carrier, ensuring its accessibility.

In addition, the recently adopted Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 (DERIII) recognises the contribution of renewable fuels of non-biological origin (RFNBOs) tosales or consumption of biofuels and other renewable fuels in transport, while also articulating specific sub-targets for renewable hydrogen in the transport sector planned for 2030.

At national level, recently, Order TED/728/2024 of 15 July was approved, laying downthe mechanism for promoting biofuels and other renewable fuels for transport purposes, which includes the aviation and shipping sectors, as well as biogas, hydrogen and othernon-biological renova fuels, in the calculation towards the 2030 targets.

b) Objectives addressed

- Development of the renewable hydrogen value chain in Spain.
- In application of the EAD of the updated NECP 2023-2030, efforts will be made to minimise the risks of GHG leakage or indirect emissions of polluting gases into the air in the production and distribution of green hydrogen.

c) Policy mechanisms

- Development of the measures contained in the Hydrogen Roadmap.
- Development of the national hydrogen regulatory framework through the incorporation and integration of the new European regulation amending natural gas regulations, as well as regulatory aspects on safety in facilities and operational staff and users, plus procedures for hydrogen logistics, transport and dispensation.
- Alignment of national targets with those foreseen in the REPowerEU Plan, the new Renewable Energy Directive and the Hydrogen and decarbonised gas package, consisting of the Directive on common rules for the internal markets in renewable and natural gases and in hydrogen and the Regulation on the internal markets for renewable and natural gases and for hydrogen.
- Administrative simplification and removal of regulatory barriers.
- Support lines for renewable H2 value chain projects under the PRTR, including the H2*Important Projects of Common European*

Interest.

- Review and update of the Hydrogen Roadmap and its objectives for adapting it to the new international and European energy and geopolitical climate.
- Measures to promote R & D & I. These actions have been included in the Hydrogen Roadmap in order to boost the leadership of Spanish companies and industries in the hydrogen economy through R & D & I through: (a) the national development of high-power electrolysers; (b) the exclusive financing of renewable hydrogen value chain projects in STREPs; (C) promoting R & D through the CDTI; (D) strengthening the role of the National Hydrogen Centre; (e) promoting R & D & I in electrolyser, fuel cell and other recycling technologies; (f) boosting the development of hydrogen-based heat production technologies.
- **Specific support within PERTE ERHA**
  - **Incentive programmes for the innovative value chain and knowledge of renewable hydrogen** under the PRTR, through Order TED/1444/2021. Support is sought for SMEs and technology centres to improve technical knowledge and productive capacity to develop large scale electrolysis, develop and improve the efficiency of electrolysers and prototype fuel cells focused on heavy transport equipment manufacturing sites along the value chain, etc.
  - On 22 December 2021, the regulatory bases for the **NEROSand unique renewable hydrogen incentives programme (H2 first-of-a-kind programme) were** approved by Order TED/1445/2021. The aim of the H2 pioneering programme is to boost the development of localised integrated production and consumption projects for the local production and consumption of hydrogen in hard-to-decarbonise sectors such as industry or heavy-duty transport. Two successful calls have been carried out so far, allocating the 150 million planned for each call and, specifically, from the second wave, to 12 new innovative renewable hydrogen projects, which add up to 309 MW electrolysis power and will mobilise an investment of more than 500 million.
  - IPCEI support programmes: Royal Decree 4/2023 of 10 January regulating the direct award of grants to Spanish projects for their participation in the Important Project of Common European Interest on Hydrogen Technology within Component 9 of the Recovery,Training and Resilience Plan, linked to the Hy2Tech wave, has already been published. In line with the above, Royal Decree 663/2024 of 9 July has been approved to allocate and distribute EUR 794 million in direct aid to the seven projects for theproduction and intensive use of renewable hydrogen in large-scale industrial activities chosen by the European Commission as part of the Important Project of Common European Interest Hy2Use.
  - Under the addendum to the PRTR, an additional budget of EUR 1.600 million has been made available, with particular emphasis on the promotion of hydrogen valleys. In this context, on 26 July the Commission approved a EUR 1.200 billion Spanish State aid scheme tohave investments in the equipment needed to foster the transition to a zero-emission economy. The scheme shall be financed through the PRTR and shall support investments in the production of renewable hydrogen with an installed capacity of at least 100 MW. Supported investments may include: production of renewable hydrogen-based fuels, storage of renewable hydrogen and production of renewable electricity.

d) Responsible

General State Administration (MITECO, IDAE, MICIU, MINTUR).

MEASURE 1.17. PLAN FOR THE REPOWERING AND REMACHINING OF EXISTING GENERATION PROJECTS ELECTRICITY WITH RENEWABLE ENERGY

a) Description

Between 22 and 2021, approximately 2 030 GW of renewable electricity capacity will have exceeded its regulatory lifespan.

Existing facilities that generate renewable electricity are an important asset given their location in places with abundant energy resources, the presence of infrastructure and the existing capacity to connect to the grid, as well as the lower environmental and land-use impact that results from developing new projects in locations already intended for energy generation. In order not to lose its energy contribution,a specific plan for the technological renovation of these installations is needed.

The **remachinery or repowering** of existing projects allows better use to be made ofthe reindeed resource by substituting old or obsolete systems with new, more powerful or efficient ones. On the other hand, both these mechanisms and **hybridisation** by incorporating different generation or storage technologies into existing projects allow for a better use of the available grid connection capacity. In addition, updating by systems that comply with the latest network codes reduces the impact of the installation on the grid, allowing for a more efficient use of the installation and facilitating the connection of new renewable power at that node.

In addition, at environmental level, remachining, repowering and hybridisation can have a lower impact byfocusing renewable generation on a given environment, reducing the total number of machines and thus the project footprint and reducing the need for new grid lines.

In the case of the wind sector, the process of repowering or remachining is in itself an opportunity to afford methe landscape and environmental integration of wind installations in the already occupied sites, since technical and technological development leads to a reduction in the number of machines for the same energy generated and better integration mechanisms with the birds and the environmental values of the environment. In addition, the newtechnology makes it possible to optimise the use of electricity grids, thereby also contributing to greaterrenewable penetration. Finally, the process of repowering or remachining will make it possible to produce a driving effect on the consolidated value chain of wind energy in our country.

In addition, the repowering of wind farms should encourage the application of criteria for the economyof excellence in dismantling existing wind installations, as well as investments in environmental and territorial improvement as an essential part of the repowering project. As regards the recycling of wind turbine components, while a significant proportion of wind turbine materials already have sustainable recycling techniques due to their typology and material, with already existing and viable secondary markets (mainly steel, but also electronic material), it is essential to promote progress and comer solutionsthat allow the recycling of the blades of wind turbines, and other components of composite materials that do not have recycling processes established at sufficient scale, so that the conventional reference process to avoid as a sine qua non condition would be landfilling.

For the mini-hydro sector, the technological and environmental renovation of installations that have been in operation for many years and with very old equipment will make it possible, in addition to maintaining exis hydroelectric capacityand improving efficiency, by introducing state-of-the-art equipment to replace equipment already obscured, adapting existing hydroelectric uses to the new environmental or hydrological conditions by means of measures aimed at protecting or improving ecosystems and at adapting and integrating the facilities in the territory.

b) Objectives addressed

Development of renewable energies through the renovation of old renewable fleets to maintain their capacity.

c) Policy mechanisms

The following mechanisms are foreseen:

- **Simplification administrative**

  Article 16 (6) of Directive 2018/2001 on the promotion of the use of energy from renewable sources states that the repowering of renewable projects shall be subject to a simplified and rapid permitting regime of no more than one year. Given that existing projects were already subject to prior administrative processing for authorisation, it is necessary to assess, inter alia, the possibility of applying the following simplifications during their processing, while ensuring proper integration into the territory of the infrastructure: exemption from the public interest procedure and from the declaration of assets and rights in question; exemption from the need to submit a new archaeological study, if one was already submitted during the processing of the existing

installation; reduction of processing times in the environmental impact assessment; shortening the time limits for informing other public administrations for administrative authorisation and the transfer of technical conditions for project approval; and simplifying the requirements for accreditation of the applicant's capacity.

In the specific case of the environmental impact assessment, the existence of common circumstances between possible repowering projects makes it advisable to establish relatively uniform criteria and conditions for the processing of repowering projects.

- **Opening of co-ordination tables with the Autonomous Communities**

In order to achieve the administrative simplification described above, the autonomous regions need to beactively involved, given their responsibilities for urban planning and the environment and the extent to which they areaware of each territorial reality.

- **Support mechanisms for technological renovation of existing renewable installations**

In line with the 'Circular repowering' programmes under the PRTR Component 7 'Deployment and integration of renewable energies', these mechanisms will contribute to the deployment and integration of renova energy, through remachining (with power less than or equal to that of the existing installation), repowering (increasing power), technological and environmental renovation and the construction ofinnovative recycling facilities, such as the recycling of blades at the end of the lifetime of wind farms.

Specifically, and as part of the Circular Repowering Programme, Order TED/1071/2022 of 8 November was published, establishing the regulatory bases for **programmes for granting investment aid for the repowering of wind power plants, for the technological and environmental renovation of mini-hydropower of up to 10 MW and for innovative recycling installations for wind turbine blades**. The first call for this support programme was formalised in November 2022, with a budget of EUR 222.5 million.

The final resolution of this call was published in November 2023, with EUR 164.15 million allocated to 161 projects, mobilising more than EUR 946 million in investment. Of the 164.15 million EUgranted, 77 % have been allocated to the repowering of wind installations.

- **Regulation of the end of concession of hydropower plants**

In order to ensure that the necessary investments are made and that the plants do not cease to operate after the end of the existing concessions, it is necessary to define by regulation the procedures and deadlines applicable to these installations and, in so far as they are compatible with the objectives of the hydrological planning, to grant new concessions in order to extend their lifetime and maintain their contribution to renewablegeneration.

(D) Responsible

General State Administration, Autonomous Communities and local authorities.

MEASURE 1.18. STRATEGIC AUTONOMY AND VALUE CHAIN

a) Description

Recent restrictions in global value chains have shown that the provision of replaceable technologiesfor the energy transition is one of the key challenges to ensure its success. In addition, it offers an excellent opportunity to take on and consolidate leadership in the production and provision of renewable technologies.

At European level, the Net-Zero Industry Act Regulation sets a necessary goal to secure and lead the green transition at European level: at least 40 % of the annual deployment needs for strategic net-zero technologies are produced in the European Union. To this end, it is necessary to reverse the clearly importing nature of the European Union of technologies necessary for the decarbonisation of the energy system.

At national level, the preliminary draft Law on Industry and Strategic Autonomy, which has as one of its objectives the promotion of greater strategic autonomy, can be highlighted. The proposed text covers all aspects related to such strategic autonomy, from the identification of production resources and capacities considered to be essential or of a strategic nature, the definition of specific ecosystems known as thegicals, the implementation of specific projects for those ecosystems, resources or capacities, and even the planning of processes that aim to prevent the loss of productive capacity, including by improving the resilience of theindustrial ecosystem.

Overall in Europe, and in particular in Spain, the import volume of photovoltaic modules issignificantly higher than export. The PV market is currently dominated by Asia (more than 90 % of the power produced). Such dependency may compromise energy security and the future availability of the large amount of power needed to undertake the current decarbonisation process. In addition, such modules should be manufactured using the best available technology and in the most sustainable way by avoiding emissions that often occur during their manufacture in the country of origin, as well as minimising emissions produced in their transport over long distances. Therefore, it seems the right time toinvest in the production of PV modules at national level.

Furthermore, in line with the EU Solar Strategy, the European Commission approved at the end of 2023 two mandatory internal market instruments that would apply to solar photovoltaic modules, inverters and systems sold in the EU: the **Ecodesign Regulation and the Energy Labelling Regulation**.

b) Objectives addressed

- Industrialisation of the value chain of decarbonisation technologies to reduce technological dependence on the outside.
- Strengthening the capacities of the domestic industry along its entire value chain in the different technologies (electricity and non-electricity) linked to clean energy and the decarbonisation of the economy, to ensure that global constraints do not jeopardise the energy transition.
- In particular, promote the sustainability of renewable generation systems by promoting the use of photovoltaic systems with a lower carbon footprint. The aim will be to facilitate the identification of environmentally leading products from socially responsible enterprises.

c) Policy mechanisms

The following mechanisms are foreseen:

- **Development of the mechanisms for investment included in the addendum to the RRP under REPowerEU for the national development of the renewable technology value chain**

  The development of innovative renewables and certain energy storage technologies makes it necessary toboost technological development in the early stages, in order to gain a differential advantage in the earlier designs of these technologies, and especially in the innovation phase, i.e. in the early stages of the value chain, including the stages of R & D & I capabilities, design, manufacturing and logistics.

  To this end, a new investment, C31.I3, has been included in the addendum to the PRTR, with a budget of EUR 1.000 million, which aims to support the launch or upgrade of manufacturing facilities for renewable generation, storage and renewable hydrogen generation/storage/distribution/consumption components and systems. As well as any other facility located anywhere in the value chain, design, manufacturing, logistics, storage, recycling, R & D & I capacities and any other facility that falls under the value chain concept.

For illustrative purposes, it may include support for the deployment of photovoltaic panels factories, larger wind turbine blades or with some technological upgrade, battery factories for energy use or other innovative storage systems, better performing electrolyser factories (going beyond the state of art), fuel cell factories, R & D & I facilities, design, improvement of logistics capacities both onshore and offshore through facilities in ports, etc.

It may also include the development and validation of more advanced prototypes of key systems/equipment/components within the wider renewable hydrogen value chain (i.e. production/distribution/consumption), storage systems or renewables generation-systems.

In this regard, a Manifstation of Interest (MDI) was held under the PRTR between March and April 2023, with the aim of gathering information, proposals and project ideas from companies, associations, and from all civil society to design lines of action in the field of the renewable energy value chain, as well as their integration into the energy system. The information gathered with this initiative will feed into the design of aid lines with an additional EUR 1.000 million foreseen in the Plan More Energy Security (Plan + SE) for strengthening the value chain in the energy transition, in line with the objectives of PERTE ERHA.

Thus, on 27 July 2024, the regulatory bases for aid for the manufacture of equipment andrapporteurs for renewables and storage were published.

With EUR 750 million from the Addendum to the Recovery, Transformation and Resilience Plan (PRTR), it will strengthen Spain's industrial ecosystem of renewable energy equipment and components, such as solar panels, wind turbines, heat pumps, batteries, electrolysers and their essential components, as well as develop new technological and industrial capacities to ensure energy security, increase our competitiveness and decarbonise industry.

The aim of these investments is to strengthen the strategic autonomy of Spain and Europe in the renewable energy and storage value chain. Support will be given to projects aimed at boosting the innovative and knowledge value chain, either by setting up industrial establishments for new manufacturing capacity or by expanding existing production facilities through new production lines and also by converting existing lines to new elements or products.

Furthermore, the Territorial Plan of the Just Transition Fund of Spain, which focuses on the provinces of A Coruña, Almería, Asturias, Baleares, Cádiz, Córdoba, León, Palencia and Teruel, has also included investment in the renewable value chain and hydrogen as one of its six main lines of action.

- **Development of the measures and investments provided for in the PERTE for the development of electric and connected vehicles**

  To this end, the call for aid for integrated actions in the industrial chain of the tricoand connected vehicle has been launched as part of the Strategic Project for Economic Recovery and Transformation in the Electric and Connected Vehicle Sector (PERTE VEC), for an amount of EUR 2.975 million.

- Promote the determination of the carbon footprint of generation equipment (photovoltaic modules, solar thermal collectors, etc.) and set limit values for their use in building regulations when determining the carbon footprint over the whole life cycle of a building. This mechanism will necessarily result in the use of generation systems that have been manufactured more efficiently.

- Requiring compliance with the new mandatory internal market instruments that would apply to solar photovoltaic modules, inverters and systems sold in the EU: the Ecodesign Regulation and the Energy Labelling Regulation will lead to improved efficiency, durability, reparability and recyclability of products and systems.

d) Responsible

General State Administration (MITECO, MIVAU, MITRAMS, MINTUR, IDAE)

MEASURE 1.19. NEW BUSINESS MODELS FOR THE ENERGY TRANSITION

a) Description

The transition to climate neutrality is a paradigm shift from the traditional energy model towards a decarbonised energy system based primarily on renewable energies, where citizens take a proactive role throughout the energy value chain. The distributed, variable and stochastic nature of renewable generation requires the gradual adaptation and digitalisation of network infrastructures, as well as the deployment of tools and services that provide flexibility to the electricity system as a whole to ensure security andsafety of supply. This creates new needs, but also numerous business opportunities open to all actors for a more dynamic, decentralised, clean, sustainable energy sector that puts citizens at the centre.

Given the potential benefits that new business models can offer to the energy system, it is necessary to articulate support mechanisms to allow the growth of its activities to reach the necessary maturity. These mechanisms should therefore make an intermediate link between knowledge generation and the deployment of systems and services on a commercial scale. The aim is, therefore, to strengthen the capacities ofthe cade of value by supporting new production lines or capacities for components and public investment in technology-based enterprises (*start-ups*) or SMEs to boost their growth, among other actions.

Therefore, since the adoption of the NECP in 2020, various measures have been implemented to support all key businessmodels for the energy transition in the PRTR through Investment 3 in Component 8 and its further development in the PERTE ERHA, in areas ranging from the regulation and creation of test ecosystems such as regulatory *sandboxes* to the definition of aid lines for companies carrying out this type of activity. This new version of the NECP thus incorporates the following objectives and measures.

b) Objectives addressed

The key objective of this measure is to boost projects of new business models that offer solutionsto the challenges posed by the energy transition, related to innovation, the provision of flexibility services allowing for the further integration of renewables, and thus favouring the decarbonisationof the system, or the promotion and development of new companies providing innovative solutions for the energy transition.

Specific objectives include:

- Fostering new innovative mechanisms and business models that give flexibility to the energy system, such as energy aggregators, or other forms of demand management.
- Transformation, innovation and digitalisation of the energy system, through data access services, actions that have an impact on the backbone of the digital transformation of the energy system, increasing connectivity, interoperability, smart energy management and cybersecurity with the possibility of including management algorithms, such as *blockchain* technology or artificial intelligence, among others.
- Contribute to the decarbonisation of the energy sector through flexibility services, by acting as an enabler for further integration of renewables into the energy system.
- Support for new business projects (*start-ups*) or innovative initiatives in the field of energy.
- Strengthening the deployment of storage along the entire value chain, including services related to recycling, material recovery and second life of equipment or promoting the use of sustainable and innovative materials.
- Accelerate technical, management and regulatory innovation by supporting the development of regulatory*sandboxes*or sandboxes, enabling new solutions to be tapped in controlled environments prior to their widespread deployment.

c) Policy mechanisms

Both the PERTE ERHA and the PRTR provide for different mechanisms of action to which this Plan isintuitive. The actions to be

taken are diverse and could fall within the following areas:

- Support for market deployment and integration into the electricity system of new demand aggregators, especially independent aggregators.
- Digitalisation initiatives promoting the installation of real-time measuring equipment, control and communication centres and aggregation platforms, as well as the insertion into the electricity system of energy resources distributed through smart systems.
- Demand management projects targeting different consumer profiles.
- Deployment of storage along the entire value chain.
- Innovative services related to energy storage and management that boost the active role of consumers.
- Support for projects launched by *start-ups* or innovative initiatives in the field of energy.
- Training and capacity building for talent.

Finally, the mechanisms envisaged to guide previous actions include:

- Calls for aid for the development of new business models in the energy transition under Order TED/1359/2022 of 28 December 2015 approving the regulatory bases for granting aid for projects for new business models in the energy transition under the PRTR. This order covers the financing of innovation projects and projects for the decarbonisation of the energy system and the launch and operation of *start-ups*, and includes the possibility of financing projects participating in the regulatory *sandbox* of the electricity sector. In accordance with that order, the Resolution of 2 June 2023 of the Board of Directors of E.P.E. Institute for Energy Diversification and Saving (IDAE), M.P., approving the first call for aid for projects for new business models in the energy transition under the 'Recovery, Transformation and Resilience Plan – financed by the European Union – NextGenerationEU' was approved.
- Public-private partnership mechanisms such as agreements.
- Direct investment in new initiatives, which may take different forms, for example investment in equity in start-ups or support for innovative actions aimed at boosting or innovating new business models linked to flexibility in the energy system or actions favouring the decarbonisation of the energy sector and the improvement of the integration of renewable energies. In this regard, as set out in the recently presented new investment strategy 2024-2026, IDAE will allocate EUR 100 million in less than three years to the capital of innovative projects aimed at accelerating the energy transition in Spain.
- Mechanisms for the training and training of professionals, including the incorporation of new professional qualifications in the framework of vocational training adapted to the new needs of the energy and environmental sector.
- Regulatory *sandbox* for the development of pilot projects in the field of the electricity sector, covered by Royal Decree 568/2022 of 11 July 2007 establishing the general framework of the regulatory test bank for the promotion of research and innovation in the electricity sector, and Order TED/567/2023 of 31 May 2009, organising access to the regulatory test bank for the promotion of research and innovation in the electricity sector, provided for in Royal Decree 568/2022 of 11 July 2007.

It should be noted that the PRTR is allocated EUR 156 million in Investment 3 of Component 8 for the development ofthese measures.

d) Responsible

Ministry for Digital Transformation and the Civil Service, MITECO, IDAE and, where appropriate, the Communities of Topic-Communities.

MEASURE 1.20. PROMOTION OF BILATERAL RECRUITMENT AND PROMOTION OF FORWARD MARKETS FOR RENEWABLE ELECTRICITY

a) Description

Around the world, cities, communities, businesses and citizens are supporting the energy transition through the demand for renewable energy. Today, many multinational companies have joined the commitment to consume 100 % renewable electricity. These companies operate in a wide range of sectors: automotive, clothing, finance, food and beverage, IT, pharmaceuticals, real estate, retail, etc.

One of the possible mechanisms for obtaining 100 % renewable electricity supply is biilateral contracting with a producer. Currently in Spain, where an increasing number of bilateral purchase agreements are in place, the main purchasers within this scheme are trading companies.

While bilateral contracts represent an opportunity, to complement other remuneration mechanisms and attract funding, they are not exempt from challenges such as those relating to the design of an optimal contract that balances the needs of the producer and the consumer, or the lack of awareness on the part of potential buyers of the existence of such a mechanism.

Traditionally, organised and unorganised forward markets in the Iberian Peninsula have not been highly liquid. One of the reasons for this is that renewable technology, incineration and waste facilities covered by the specific remuneration regime, which cover approximately 38 % of electricity demand, establish strategies to sell their production on the day-ahead and intraday market without participating in forward markets.

Moreover, the lack of liquidity in forward markets is being aggravated by the extended time of the war in Ukraine and the current context of uncertainty, high prices and volatility in energy markets, which increase the cost of the guarantees required in forward contracts that incorporate an additional risk premium. This makes it necessary to adopt measures to promote liquidity in forward markets,in particular from renewable sources, so as to provide greater stability in electricity prices.

In this regard, the reform of the electricity market calls for forward contracting as one of the solutions that allows suppliers and consumers to protect themselves against the risk of future price volatility, providing certainty and stimulating investments.

Moreover, the procurement of energy efficiency measures in the public sector is addressed separately in Measure 2.17. Public sector: accountability and energy-efficient public procurement.

b) Objectives addressed

Development of renewable energies and participation of new players, by promoting the procurement of 100 % renewable electricity.

c) Policy mechanisms

In addition to the mechanisms provided for in the specific renewable energy procurement measures and promoting the proactive role of consumers, mechanisms to encourage long-term bilateral procurement with renewable energy producers, such as instruments to reduce the risk of such operations or minimum contributions for certain large energy consumers, will be analysed.

Further progress will be made in the implementation of mechanisms to promote the long-term procurement of renewable electricity, in line with the European Commission’s proposal and in accordance with the new regulation in which it results.

d) Responsible

Sectoral associations, MITECO, autonomous communities and local authorities.

MEASURE 1.21. SPECIFIC PROGRAMMES FOR BIOMASS HARVESTING

a) Description

The management and use of biomass entails added value elements in addition to its excloneenergy potential. In particular, it revitalises the rural environment and mitigates the risk of depopulation, in addition to promoting better adaptation of certain territories to the effects of climate change. Biomass can also play an instrumental role in the field of just transition. This is why the organicmass is part of various strategies promoted by the different public administrations beyond the scope of this Plan. Moreover, the associated waste is a key element of the circular economy. It is therefore necessary to develop actions to facilitate the connection and achievement of both objectives: just and economicallycircular transition, all of which minimises the level of air pollutant emissions and respects the waste hierarchy laid down in Law 7/2022.

Article 27 of Law 7/2022 of 8 April 2003 on waste and contaminated soil for a circular economy, ofa general nature, does not allow the burning of plant waste generated in the agricultural or forestry environment, except exceptionally and authorised for phytosanitary reasons or, in forestry environments, when it is not possible to dispose of and subsequently manage it. The implementation of this Law may lead to increased use of these resources for various applications, including and significantly energy applications. For biomass heat and electricity, it is expected that the greatest development will take place with **biomass of forest or agricultural origin** (industria, in general, it is already used).

At European level, Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources has established since 2021 an obligation for solid biomass used in electricity generation to comply with sustainability and GHG reduction criteria in order to be able toresupport and count towards the renewable targets of the NECP. For the verification of compliance with thetwo criteria, the Directive allows the use of voluntary private schemes or national schemes developed by the competent authorities.

The biomass used in Spain is mostly of residual origin and is located close to the contours, with a large number of small operators along the value chain. Thesecharacteristics differ from those in other countries, where biomass is supplied in high volumes of-homogeneous biomass managed by a small number of operators and largely from imports.

Due to the particularities of biomass consumed in Spain, the verification of these criteria entails significant costs and administrative burden for the different subjects operating along the value chain. The aim of this measure is therefore to analyse the state of play of the verification of the sustainability and GHG emissions reduction criteria in Spain, and to identify actions aimed at simplifying and reducing the burdensarising from existing procedures.

b) Objectives addressed

Penetration of renewable energy sources and displacement of fossil fuels, involvement of new players and innovation.

The simplification and burden reduction measures will continue to ensure compliance with the criteria laiddown in the Community Directive, but adapted to the Spanish situation. The incorporation of biomass supplies managed by small operators will be facilitated, increasing the supply, stability and continuity of biomass supply for electricity generation. At the same time, it will contribute to reducing barriers to the exploitationof forest residues, contributing to forest management and fire prevention, as well as topleo in rural areas, taking into account that biomass extraction should be carried out in the most sustainable way possible. The sectors covered will be those associated with the activities of harvesting solid biomass (whether from forestry or agricultural origin), the processing or blending of biomass from different origins, and the transport of such biomass to power generation plants.

c) Policy mechanisms

With regard to the specific mechanisms to be developed, the following are highlighted:

- **Promotion of energy from biomass with sustainability criteria**

- Regulatory development throughout the biomass value chain.
- The amendments introduced by Directive 2023/2413 will be transposed into national law. In particular, the sustainability criteria for the harvesting of forest biomass shall be reviewed and policies to promote biomass shall be adapted to the cascading principle. This should take into accountthe specific characteristics of the forests and the Spanish forestry sector and ensure that resources are properly managed in order to preserve the productive capacity and natural values of ecosystems. Strategy for using energy from pruning debris in the agriculture sector.
- Regulatory analysis and verification procedures for sustainability and GHG emissions of biomass for electricity generation, as well as consideration of possible simplification and burden reduction measures in existing procedures.
- Strategy for using energy from pruning debris in the agriculture sector.
- Adaptation to air quality obligations in biomass installations, both new and existing ones, and study possible measures to reduce emissions when there is a risk that regulated air qualityvalues will be lowered.
- Dissemination and promotion of certification and the principle of proximity of origin in the harvesting of biomass.
- Dissemination and promotion of high-efficiency and low-emission local heating and other equipment.

  Campaigns will be carried out to publicise the benefits of purchasing equipment manufactured in accordancewith the applicable EU Ecodesign Re.

  Developments related to applicable eco-design regulations will be monitored and a joint position of MITECO on Spain's needs foreco-design repurposing related to biomass combustion equipment will be presented in the appropriate fora.
- Specific training for installers and other professionals in the biomass sector.

Economic support measures linked to:

- Biomass logistics and processing plants.
- Chapter II of Law 7/2022 of 8 April 2003 on waste and contaminated soil for a circular economy establishes a tax on landfilling, incineration and co-incineration of siduouswaste. The penalisation of landfilling was one of the measures envisaged in the original reactionof the NECP.
- Use of biomass in public facilities.
- Royal Decrees 477/2021, 1124/2021 and 948/2021 under the PRTR help to support the installationof biomass for thermal use in all potentially consumer sectors.

(D) Responsible

General State Administration and Autonomous Communities. MITECO.

MEASURE 1.22. UNIQUE PROJECTS AND STRATEGY FOR SUSTAINABLE ENERGY IN THE ISLANDS

a) Description

Before their widespread implementation, all technologies, including energy technologies, have to go throughthe promise of demonstrating their effectiveness and availability, known as the 'valley of death'. This stage, associated with the integration of R & I & c policies with market development, is typically characterised by a combination of a substantial increase in investment needs and a low level of technical reliability. Many technological developments fail to overcome this due to the lack of investment (public and private) needed to make the leap from the pilot project stage, which should encourage public administrations and the private sector to join forces through the formation of consortia.

The details of the innovative technologies whose development will be necessary to achieve the objectives of the National Plan are in the fifth dimension of this National Plan. As far as this measure is concerned, it should be mentioned that the uniqueness not only corresponds to innovative projects, but also concerns the challenges to be faced. For example, geographic (insularity) or market, such as the high-Tempe ratura geothermalfor large-scale electricity generation, which does not have a market in Spain despite being a mature technology, or the case of offshore wind which, if developed around island territories, would meet the two main aspects of uniqueness sought. In addition, it has been identifiedthat the use of these island territories as tractors and 'tips de lanza' for the deployment of offshore wind was an opportunity in the short period, associated with the incorporation of storage and support requirements for the electricity system, with a greater impact on GHG emission reductions and even avoiding current costs for the electricity system and associated with the General State Budget. It is essential for the public sector, in partnership with the private sector, to lead pilot or demonstration projects that can prove the viability or need for new models or systems that have not yet reached full commercial development.

b) Objectives addressed

- Market development for new renewable energy technologies.
- Implementation and development of test beds to identify barriers and solutions, to establish criteria and regulations, and to develop, develop or integrate new renewable energy projects into the market.
- Boosting flexibility and demand-side management, in parallel with the development of storage systems.

c) Policy mechanisms

They include the following:

- **Plan to develop unique projects**

  Programme aimed at involving IDAE in individual or demonstrative projects where the Institute's contribution or public-private partnership is of particular relevance. The support scheme best suited to the development of the project, including those covered by the IDAE Investment Strategy 2024-2026, may be used.

- **Sustainable energy on islands**

  In May 2017, Spain signed, together with the European Commission and 13 other Member States, the Political Declaration on Clean Energy for the EU Islands, recognising their potential to be the architects of their own energy transition, as well as the opportunity to use these territories as a test ground for energy transition technologies or policies that can then be exported to the continent. With this work, the General State Administration will promote sustainable energy strategies in the Balearic and native islands,in cooperation with the respective regional and island governments, which in turn will enable the corresponding energy costs to be reduced. In particular, the aim shall be to ensure that renewables are properly integrated into the territory and that they can also provide firm power and other services such as frequency stabilisation or black start in case of voltage zeros, as well as zero-emission mobility and integratingthe change of energy model into the water cycle.

  The programmes "Sustainable Energy Strategy in the Canary Islands" and "Investment Plan for the Energy Transition of the Balearic Islands", developed by the Autonomous Communities of the Canary Islands and the Balearic Islands respectively, were

presented on 16 February and 14 March 2022.

The Sustainable Energy Strategy for the Canary Islands is based precisely on the NECP, and in particular on its aim to reduce the energy dependency of islands and promote the integration of renewables into the territory in order to ensure the stability of the electricity system. The strategy aims to mobilise EUR 466.67 billion through 7 investment programmes. These programmes provide an important boost to the energy transition of the Canary Islands in the coming years, thus enabling progress to be made in decarbonisation in advancefor 2040, in accordance with the terms of the Declaration of Climate Emergency of the Canary Islands approved by Government Agreement in August 2019 and ratified by the Parliament of the Canary Islands in January 2020.

For its part, the Energy Transition Investment Plan of the Balearic Islands aims to push forward an agenda for the energy transition in the islands. This Plan aims to achieve a social and justenergy transition, accelerate the transition in the Balearic Islands and address unique challenges in this territory that have not been addressed in other aid lines. The plan is worth EUR 233.34 million and is divided into three main axes (Energy Transition Facilitation Offices, Support to boost the gene transition and Investmentsin Innovative Projects) which are implemented in six programmes.

Royal Decree 451/2022 of 14 June 2015 regulating the direct granting of aid for the financing of sustainable energy strategies for the Balearic Islands and the Canary Islands, as part of the Recovery, Transformation and Resilience Plan

This Royal Decree transfers EUR 498.7 million to the Balearic Islands and the Canary Islands (EUR 197 million andEUR 301.7 million respectively) for the following actions:

A) Revitalisation of the sustainable energy programme on islands. Support for transition agentsby setting up or managing offices for the energy transition on islands, whose functions may include support in the design, processing, drafting of specifications, tendering and implementation of municipal and island projects, as well as the financing of actions such as conferences and days.

B) Aid programmes for new renewable installations aimed at promoting installations that couldprovide guarantees of power, unique projects and sustainable energy on the islands. The integration of renewables into the grid and projects ensuring power, stabilising frequency and black start will be the focus of this support programme.

C) Smart Islands aid programme for the development of projects promoting the integration of smart systems, specifically the development of projects on islands that promote flexibility of demand or supply, as well as any other measures to facilitate the tegrationof renewables in the island system.

D) Clean Energy for EU Islands support programme promoting investments in renewable projects in accordance with the analysis of the proposals and results of the expression of interest and the above-mentioned European programme.

E) Aid scheme for sustainable storage projects with new renewable energy generation capacity, enabling their deployment to optimise renewable generation management.

F) Initial encouragement for the promotion of energy communities, support for management for the creation ofnew communities and development of the transition agendas of each island, through dissemination, support, advice and encouraging specific actions to promote the development of projects in these communities.

Creation and management in IDAE of a clean energy office and smart projects for islands

Centrally managed aid lines under the PRTR

• Demand management or storage

This aid is channelled through Order TED/448/2023, of 28 April, establishing the regulatory bases for the programme for granting aid for electricity generation installations on the islands, using renewable energy sources, as part of the recovery, transformation and resilience plan, financed by the European Union-NextGenerationEU, and which aims to support investment projects in electricity generation installations usinginnovative renewable sources that guarantee firm power to the

system or have a strong social character. the repowering or technological renewal of obsolete installations close to the end of their life or the integration of storage systems into generation facilities, which may include investment measures in the production of renewablehydrogen or those that improve management and optimise production, enabling energy to be consumedand incorporated into local markets in the Balearic Islands and the Canary Islands.

In addition, in other lines of centralised management under the PRTR, specific budgets have been made availablefor projects on the islands, such as:

A) Promotion of renewable energy actions integrating demand management systems orstorage lutions, through specific programmes for islands that enable national or European funds to be directed.

B) Implementation of sustainable storage projects with new renewable generation capacity, enabling their deployment for optimisation of renewable generation management or *stand-alone*. The following calls are highlighted in this field:

The first call for aid for innovative energy storage projects hybridised with electricity generation facilities, published under Order TED/1177/2022 of 29 Decemberapproving the regulatory bases for granting aid to innovative energy storage projects hybrid with electricity generation facilities from renewable energy sources under the PRTR, which includes a specific budget for projects in the Balearic Islands (EUR 6 million) and the Canary Islands (EUR 20 million).

The aid for geothermal authorised in Order TED/467/2023 of 28 April approving theregulatory measures for granting aid for feasibility studies for innovative projects for the use of deep geothermal energy under the NextGenerationEU Recovery, Transformation and Resilience Plan (financed by the European Union), where EUR 60 million of the EUR 120 million called for was reserved for projects in the Canary Islands.

Aid for innovative energy storage projects under the Recovery, Transformation and Resilience Plan, authorised by Order TED/807/2023 of 17 July, which, in the call for aid for innovative independent electricity storage and thermal storage projects, has been allocated specific budget for island territories, along the lines of stand-alone or*stand-alone*projects, with EUR 15 million for projects in the Autonomous Community of the Canary Islands and EUR 4 million for projects carried out in the Autonomous Community of the Balearic Islands.

- Initial promotion of the promotion of energy communities, the management and creation of new communities and the development of the transition agendas of each island, through dissemination, support, advice and encouraging specific actions to promote the development of projects in theseareas.
- Aid mechanisms for the development of medium and high enthalpy deep geothermal in the Canary Islands.

-Aid programme for the exploration and research phases of geothermal resources with the aim of mitigating the risk inherent in these phases, which is necessary for the development of the first deep geothermal projects in Spain. Support mechanisms for the development of *offshore wind installations and offshore* technologies. It will also be necessary to advance the interconnection between non-peninsular systems and reduce the energy dependency of these territories, as set out in Measure 3.3 Reduction of energy dependency on the islands of this Plan.

(D) Responsible

General State Administration (MITECO, IDAE), Autonomous Communities of Islands.

MEASURE 1.23. ENERGY COMMUNITIES

a) Description

The aim of European legislation is to boost the role of citizens as a driver of the energy transition. To this end, it defines two new

entities:

- Renewable energy community (as defined in Directive 2018/2001 on the promotion of the use of energy from renewable sources).
- Citizen energy community (as defined in Directive 2019/944 concerning common rules for the functioning of the internal market in electricity).

To this extent, the term ‘energy communities’ encompasses the two types of entities.

Energy communities are a crucial element for the just and inclusive component of the energy transition. This is illustrated by the fact that one in two pilots of energy communities from the first two calls forthe EC programme is implemented in whole or in part in municipalities of the Demographic Challenge, that 86 % of all partners and all partners in those energy communities are natural persons, or that one in ten of the projects seeks to tackle energy poverty by including vulnerable consumers among their partners. Therefore, specific measures must be taken to promote them.

Both legal entities have common elements: they should be based on open and voluntary participation, controlled by partners or members that are natural persons, small or medium-sized enterprises and local entities and should aim to provide environmental, economic and social benefits to their partners or members or to the local areas where they operate.

The main difference between the two categories is that, while the objective of the renewable energy community is the realisation of projects of any kind (electricity, thermal or transport) provided that the gene originis renewable, the citizen energy community has been designed to cover any project related to the electricity sector, including distribution, supply, consumption, aggregation, energy storage, pre-commissioningof energy efficiency services or the provision of charging services for electric vehicles, or other energy services to its members.

In particular, renewable energy communities are listed as a new figure in the electricity sector, in Article 6 (j) of Law 24/2013 of 26 December 2003 on the electricity sector, in implementation of the amendment to Article 4 of Royal Decree-Law 23/2020 of 23 June 2007 approving measures in the field of energy and in other areas for economic recovery.

Renewable energy community partners should be located in the vicinity of renewable energy projects owned and developed by those legal entities.

Article 183 of Royal Decree-Law 5/2023 of 28 June includes a section (k) in Article 6 (1) of Law 24/2013 of 26 December on the electricity sector, to include citizen energy communities as a new figure in the electricity sector. In addition, two new Articles 12a and 12b are added incorporating the regulatory principles of renewable energy communities and citizen energy communities.

Among other measures, an assessment of existing barriers and their development potential will be carried out. It should also be ensured that they are able to produce, consume, store and sell renewable energy, including through renewable power purchase agreements, as well as access to all suitable energy markets,both directly and through aggregation.

b) Objectives addressed

-Facilitate equal participation of citizens, SMEs and local authorities in the energy transition.

c) Policy mechanisms

- The PRTR foresees the promotion and development of energy communities through a targeted reform within Component 7 “Deployment and integration of renewable energy”. Specifically, reform C7.R3 ‘Development of energy communities’ of this component articulates a roadmap for energy communities that ultimately aims to create and consolidate energy communities, through a three-step approach and complementary support mechanisms.

  This reform has a budget of EUR 100 million. The first two phases, Aprende and Planifica, aim to activate participatory, informative and informative processes, as well as the legal constitution of these figuras. The third, implements, in addition to other actions, the promotion of demonstration projects with geographical, technological and social diversity to remove barriers to

market entry and to validate business models and possible innovations at technical or social level. This promotion includes the possibility of formalising aid lines for investment in these lines. The development of these phases will be complemented by the creation of Community ProcessingOffices, which will support the dissemination of these figures, as well as the supportand advice of the actors seeking to set them up.

The four calls under the EC programme, with a budget of EUR 80 million, have been closed with the award of aid to more than 120 energy community projects and the OTCs call has supported 79 community transformation offices.

The success of the previous calls led to the publication of the regulatory basesfor a new aid scheme on 25 July 2024. Endowed with an additional EUR 120 million to create unique energy community projects, the aim of these new EC lines to implement 5 and 6 is to promote multi-componentprojects that can combine various actions. The aim is to ensure that energy communities go beyond self-consumption, with the potential to involve renewable air conditioning, sustainable mobility and storage systems, with the aim of improving the integration of renewables. .

- Removing barriers and promoting the development of energy communities, through the establishment of a network of offices throughout the national territory and other measures to promote the concept of the energy community through dissemination and training measures; supporting and advising energy communities in their formation processes, through technical, administrative, economic, social or legal consultancy linked to the implementation of specific projects to set up and operate energy communities.

  For the removal of barriers related to the development of energy communities and their projects,in addition, measures will be deployed to facilitate their legal constitution and reduce the risk to theThematic stages of their development (e.g. administrative, technical and financial feasibility studies).

- Establishment of a network of knowledge and experience, coordinated by IDAE, and composed of the network of offices and other actors related to the development of energy communities, to identify and disseminate best practices; identify mechanisms for collaboration between different types of actors and territorial areas and develop in a coordinated manner instruments to support and promote energy communities.

- Promotion of energy community demonstration projects covering as broad a case as possible, identifying and enabling viable business models for the different project typologies, enabling their large-scale development.

- Training and capacity building programmes to enable energy communities to have the human and technical resources to identify, process, implement and manage projects, as well as mobilise the necessary investments.

- Promotion of the development and implementation of industrial micro-networks and the creation of industrial energy communities.

d) Responsible

MITECO and IDAE, in coordination with other ministerial departments with a wider field of the social economy.

MEASURE 1.24. CITIZENSHIP IN THE CENTRE

a) Description

Citizens are at the heart of the energy transition, bearing in mind that: (1) the success of the energy transition, which largely depends on the social acceptance of projects, (2) has the potential to drive policymaking and enhance greater corporate social and environmental responsibility, (3) it is involved in jobs generated and (4) it can consume, finance, invest, sell, exchange, manage and produce freshenergy. The transition to a decarbonised energy system is a technological and societal challenge of firstMagni, but also an opportunity to give citizens a central role in the energy sector, in line with the Clean Energy Package for all Europeans.

According to the 2022 Eurobarometer, Spain is the country most concerned about climate change across the European Union with a total of 90 % of the population who consider it "a very serious problem". In addition, thispre-occupation is deepened by the new generations: 4 out of 5 young people are interested in environmental issues. Around 80 % of young people and young people are mostly in favour of policies promoting recycling, banning plastic packaging in supermarkets and incentivising renewable energies. It is therefore necessary to translate this social concern into participatory mechanisms. Evidence of this concern and willingness to participate is precisely the success of the self-consumption support programme and the strong deployment it has experienced in recent years.

According to a 2017 study,59 30.9 % of users in Spain would like to exercise their purchasing power and choose a new electricity supplier to ensure that they produce and sell 100 % renewable electricity, owned by citizens. Citizens' financial participation in renewable energy production projects helps to direct household savings towards financing the energy transition. The study cited states that: 12.1 % of respondents would take the role of an investor who invests theirsavings in renewable energy generation plants directly, without being co-owners. 16 % would beinvolved in co-owning a renewable installation financed by private individuals, which demonstrates the development potential of energy communities, whether in the electricity or thermal fields.

These attitudes contribute to a better socio-economic anchoring of renewable energies in the territories, particiPando in local development, and making it possible for people to raise awareness or even mobilise themselves on energy issues. The challenge is to promote the proactive role of citizens in the energy transition and more specifically in the deployment of renewable energy.

b) Objectives addressed

- Empowering citizens in a framework of equality and promoting their participation in the energy transition.
- Improve their ability to choose 100 % renewable supplies and encourage companies to redirect their offer towards a more renewable service to offer it to a consumer with greater social commitment and environmental responsibility.
- Promote the mobilisation of available funds by citizens to help finance the renewable energy transition or manage their own energy.
- Promoting citizen participation in the definition of local, regional and national energy policies.

c) Policy mechanisms

The following mechanisms are foreseen:

- **Mechanisms to promote the diversity of actors** and the existence of **participatory citizen projects**. Mechanisms will be established by regulation to promote the diversity of actors and the existence of participatory citizen projects, promoting both social and territorial cohesion and the just transition and exploiting the opportunities of the new decarbonised generation model. See calls for support for energy communities under the PRTR to the corresponding measure.

  A membership mechanism shall be established whereby participative projects can access a contract for the sale of their electricity at a fixed price linked to the outcome of the auctions. An annual quota shall be set aside for these to be granted to those who apply for them and comply with the requirements up to the energy share. In addition, consideration will be given to providing public guarantees for projects opting into the mechanism to facilitate financing and make them more affordable. In addition, auction design options that favour projects that take into account the social component will be considered, inter alia, through citizen participation in funding or the existence of a profit-sharing plan, where part of the revenue is earmarked for activities agreed with local actors.

- **Support and collective funding instruments adapted to the real environment of cities and rural** areas, providing for competition criteria and ensuring local citizen participation either directly or indirectly (i.e. cooperatives, owners'/neighbours' associations). Existing options for timely aggregation of projects will be explored, facilitating, among others, access to

59 Collaborative energy. The power of citizens to create, share and manage renewables; Greenpeace; 2017

European support mechanisms (i.e. ELENA60 or CINEA61) for the development of renewable projects in general, as well as green and innovative public procurement tenders. As regards rural development, Measure 1.2. Development of renewable energies compatible with the territory and cultural development, pays particular attention to this issue.

Promotion of mechanisms for action at municipal level to promote partnerships or partnerships between municipalities and citizens, given the existing synergies and the mutual benefits to be achieved. The municipality can be a strategic advisor when co-investing as a partner in participatory citizen projects, or even becoming an infrastructure operator (existing or future) with a high impact/impact on the success of so-called citizen participatory projects. In this regard, attention is drawn to the DUS 5000 aid programme under the PRTR, which was specifically aimed at municipalities with fewer than 5.000 inhabitants, which was set out in Royal Decree 692/2021 of 3 August regulating the direct granting of aid for investments in individual local clean energy projects in municipalities facing demographic challenges (PROGRAMA DUS 5000), as part of the PRTR Regeneration and Demographic Challenge Programme. This aid programme has a budget of EUR 675 million.

- **Identification and removal of technical, legal, administrative and economic barriers** to the introduction of direct purchase of renewable electricity between producers and consumers regardless of their size, with the aim of facilitating a greater positive impact on the energy transition of citizens' purchasing power. This guarantees consumers that they are actually paying for renewable energy. In addition, unlike guarantees of renewable origin, the total hourly coverage of the consumer with renewable energy is ensured.

- **Public participation in demand management** (individual or aggregated), through the necessary mechanisms to ensure that tariff, toll and electricity charging structures are designed to convey a favourable signal for both active demand management and consumption reduction. The promotion of demand management in general is encouraged by another specific measure of this Plan.

- Full right of the consumer to have real-time access to his energy data at no additional cost and to assign it to third parties without hindrance. In order for citizen activation to become a reality, there is a need to improve knowledge of the energy sector and transparency on information on the energy system. In this direction, work will be carried out with local authorities and civil society to develop information and advice systems for citizens on their energy, bills, consumption, environmental and social impacts.

- **Monitoring the alignment of the NECP's actions with the objectives and recommendations set by the Citizens' Climate Assembly**. In accordance with Article 39 (1) of Law 7/2021 of 20 May on Climate Change and Energy Transition and the Declaration on the Climate and Environmental Emergency in Spain, approved by the Council of Ministers in January 2020, the Citizens' Climate Assembly is established with the aim of strengthening existing participatory mechanisms and ensuring in a structured way citizens' participation in the decision-making process on climate change. The outcome of the deliberations of the Assembly was set out in a final report of conclusions, which the Council of Ministers was right to adopt on 11 July 2022, while providing for its referral to the Congress of Deputies. In its statement of reasons, the Spanish Government undertook to analyse and evaluate the recommendations in order to integrate them into the executive's action, which have already been taken into account in this update of the NECP.

d) Responsible

MITECO and IDAE.

MEASURE 1.25. JUST TRANSITION STRATEGY

a) Description

The energy transition will create many opportunities for economic development and employment, although in some cases they have had particularly significant negative impacts in areas where the weight of fossil fuels in the local economy is relevant, such as coal

60 Elena – European Local Energy Assistance
61 European Climate Infrastructure and Environment Executive Agency

in Spain. During the cambio process, it is therefore necessary to support the economic sectors most affected by supporting the adaptation of municipal infrastructure, business fabric and businesses and people to the new situation.

According to the report "Supporting just transition regions: The role of the social partners "of the European Foundation for the Improvement of Living and Working Conditions (EUROFOUND), whose role is to promoteknowledge to contribute to the development of better social, employment and work-related policies, is crucial to promote greater involvement of trade unions, at regional level, in the governance of territorial just transition plans. A just green transition can only be realised through the genuine involvement of social partners through social dialogue and collective bargaining.

In order to incorporate the just transition into energy transition and decarbonisation policies, the Just Transition Strategy was presented in February 2019 as a supportive strategy to ensurethat people and territories take full advantage of the opportunities of this energy transition, within the Strategic Energy and Climate Framework. In addition, the Climate Change and Energy Transition Act incorporates the obligation to approve Just Transition Strategies every 5 years to accompany the effects of decarbonisation, and the Institute for the Just Transition is established as the body tasked with coordinating and implementing the relevant measures.

Together with the Just Transition Strategy (JTS), an Emergency Action Plan for short-term challenges was adopted: closure of mines, coal-fired thermal power plants and nuclear power plants under closure.

At present, the closure of coal mining in 2018 is accompanied by the closure of the ThermoelécCoal Tricas. Of the 15 coal-fired thermal power plants active in 2018, only 5 are still in operation and all of them are concealedwithin the closure agreement, which is estimated that around 2025 will be fully shut down. This is in addition to the closure of nuclear power plants without previous conversion plans.

The work started through the signature of two tripartite agreements between the Spanish government, businesses and trade unions:

- The first – Framework Agreement for a Just Transition of Coal Mining and the Sustainable Development of Mining Regions for the Period 2019-2027 – was signed in 2018, together with the unions Comisiones Obreras (CCOO), General Union of Workers (UGT) and Unión Sindical Obrera (USO) and the National Federation of Coal Mining Employers (Coal) to promote economic revival and alternative development of mining districts to achieve their structural transformation, economic recovery and social well-being. This agreement has a high level of compliance.
- The second – *just energy transition agreement for closed thermal power plants: employment, industry and territories* –signed in 2020 by MITECO together with the Ministry of Labour and Social Economy, trade unions and companies owning coal-fired power stations, to promote employment in the territories and channel aid programmes for economic and industrial dynamisation linked to the deployment of renewable energy and other industrial projects linked to the clean energy transition.

As a key instrument for implementing the measures, the Just Transition Conventions are developed, with a view tofostering economic activity and its modernisation, as well as the employability of vulnerable workers and groups at risk of exclusion in the transition to a low-carbon economy, in particular in these cases of closure or redeployment of facilities, as set out in Article 27 and 28 of Law 7/2021 on Climate Changeand Energy Procurement. Article 27 also requires the ETJ and its implementation and development instruments to be developed taking into account the gender perspective. Consonant with this, the ICJ and theWomen's Office (INMUJERES) signed in 2021 a general partnership protocol for the developmentof actions in the framework of the drafting of the Just Transition Conventions with regard to promoting entrepreneurship and improving the employability and working conditions of women in the territories affected by the energy transition. In addition, the Strategic Plan for Effective Equality of Women and Men (PEIEMH) 2022-2025 includes measures in this line.

The Just Transition Institute (JTI) regularly carries out analyses of the results of the measures related to the decommissioning of coal and the closure of nuclear power plants that are being taken as part of the Just Transition Conventions since 2019. These measures have a territorial focus in the municipalities that are part ofsome of the 15 Conventions. Progress reports by convention are available on the ICJ website. They include information on approved projects (municipal infrastructure, business initiatives and reindustrialisation, small investment projects), social support and results of the Dinamiz-ARTj cultural programme's training programme and results. In addition, information is provided on the projects proposed by the companies that close the thermal power

plants under the current agreement in each area covered by the agreements.

Furthermore, the ETJ includes the obligation to carry out an analysis of the socio-economic and employment impacts of the measures taken under the JTS every 5 years. The JIT is currently working on the development of the ETJ analysis framework currently in force and ending in 2024. It is estimated that the analysis will beavailable in 2025.

Based on these results, the new objectives as well as policies and measures needed to adequatelyaddress the identified challenges for the country's just transition after 2024 will be identified. These new objectives, policies and measures will be part of the new Just Transition Strategy to be developed in the course of 2025.

b) Objectives addressed

- Maximise the social gains of the green transformation and mitigate the negative impacts this transition may have on certain territories and people, leaving no one behind. It mainly focuses on elements related to supporting the transformation of economic sectors towards the green economy, and to generating and protecting the employment of declining sectors in the affected areas, including boosting the training required by the labour market for such transition.
- The strategic objectives set out in the Just Transition Strategy include:
  - Facilitating the exploitation of employment opportunities and improving competitiveness and social and territorial cohesion generated by the green transition of the economy
  - Ensure equal use of opportunities, on the one hand, through gender equality measures that reduce women's employment inequalities in the green transition and, on the other hand, through measures for groups with particular difficulties
  - Provide public administrations and Spanish society with a dynamic and forward-looking ability to observe the situation and trends in the labour market with regard to the transformations that occur in the labour market as a result of the green transition.
- Development of Just Transition Agreements as co-governance tools with regional and local administrations to ensure the commitment and coordination of public administrations and propose support instruments for maintaining and creating activities and jobs in the districts affected by the energy transition, supporting sectors and groups with reskilling needs, maintaining the population in rural areas and promoting diversification and specialisation consistent with the socio-economic context of each area. Citizens have access to public participation channels.

c) Policy mechanisms

The Just Transition Strategy is the state-level instrument aimed at the green transition of the economy and the adoption of measures to ensure fair treatment of workers affected by the transition, materialised through the Just Transition Conventions.

The Just Transition Conventions include measures such as:

- Support for alternative business initiatives to generate employment and economic activity in the affected areas.
- Support for municipal and infrastructure projects to provide adequate services to citizens and businesses to maintain their life and activity in the territory.
- Support for affected workers through social support, vocational training and requalification programmes, job pools and recruitment incentives in the support instruments deployed for businesses and local authorities.
- Boosting the environmental restoration of areas degraded by coal mining, prioritising mining workers affected by closures in their recruitment.
- Support for cultural activities and the valorisation of mining heritage and identity.

- Promoting gender equality, especially taking into account the masculinisation of employment in mining districts, including incentives in the various support instruments that promote the employment of women.
- Boosting the energy transition as a driver of employment and activity. Through (1) the inclusion of prioritisation criteria for affected areas in the support instruments for renewable energy, renewable hydrogen and energy storage; (2) by allocating the electricity grid access capacity released after the closure of thermoelectric plants to renewable energy projects through just transition competitions, prioritising projects that maximise socio-economic and environmental benefits for transition areas.

There are currently 15 Just Transition Conventions in place, where further work and deployment of measures will continue: 3 in Andalusia (Carboneras, Puente Nueva Valle del Guadiato and Los Barrios); 1 in Aragon; 3 in Asturias (south-west, Valle del Nalón and Caudal-Aboño); 4 in Castilla y León (Central Latvian Montaña – La Robla, Bierzo-Lazana, Guardo-Velilla and Garoña); 2 in Galicia (Meirama and As Pontes); 1 in Mallorca (Alcudia); and 1 in Castile-La Mancha (Zorita). For the development of the Just Transition Conventions, public processes involvingmore than 800 actors have been opened and more than 2.000 ideas and proposals have been received. In the agreements that were launched before the initiatives in which work has been done through the agreements or aid granted would create a similar job as in the closed facilities.

Target groups, forms of support and dedicated resources:

The main target groups of the just transition measures are:

- Workers affected by the energy transition linked to the closure of coal mining, coal-fired thermal power plants (direct workers and auxiliary workers) and nuclear power plants.
- Municipalities that are part of the Just Transition Territories receiving support for the development of municipal and social, environmental and digital infrastructure projects that promote entrepreneurship and services for local businesses.
- Local businesses, new industrial investments and entrepreneurs in areas affected by closures. Renewable energy and energy efficiency projects located in just transition municipalities receive priority support linked to the PERTE for Renewable Energy, Renewable Hydrogen and Storage and managed by IDAE.

The main forms of support are:

- Support for the development of municipal infrastructure
- Support for the development of business and industrial fabric and small investment projects
- Environmental restoration of abandoned coal mines. These projects have priority in the recruitment of former coal workers who have been affected by the closures.
- Green job training programmes and employment support through the creation of two labour exchanges for workers affected by the closure of coal-fired power plants and coal mines
- Counselling service to improve the employability of mining workers through personalised job-search assistance
- Tripartite social dialogue with trade unions and private sector involved in the closure of coal mines and coal-fired power plants
- Public participation in the design and implementation of the Just Transition Agreements and associated support instruments, open to citizens, NGOs, universities, local businesses, trade unions, local and regional governments, etc.

The development of these support lines will be dedicated to own financial resources, European funds from the Recovery, Transformation and Resilience Plan (RRP), component 10 of which is targeted at the Just Transition Strategy, and the Just Transition Fund (JTF).

d) Responsible

Institute for Just Transition O.A (MITECO), in cooperation with the Ministry of Labour and Social Economy, MITRAMS, MIVAU and MINTUR, in cooperation with regional and local governments and ritual business organisations, trade unions and other social organisations.

Cross-cutting measures to promote renewable energy

MEASURE 1.26. PUBLIC PROCUREMENT OF RENEWABLE ENERGY

a) Description

At present, Framework Agreement 23/2017, formalised on 31 July 2018 on the supply of energy tothe General State Administration, its autonomous bodies, management bodies and joint social security services and other public state entities, and other members, provides that the supply of electricity shall have a 50 % guarantee of origin, unless the body concerned has established a higher percentage in the additional requirements. As a notable example, since 2019, 100 % of the electricity adqui ridaby Adif and Adif AV has been certified as a guarantee of origin. Therefore, the electricity consumed by therailway sector – some 2.700 GWh/year, being one of the largest buyers of electricity – both by both entities and by rail operators, is of renewable origin and free of GHG emissions.

For its part, in December 2018, the Council of Ministers approved the Green and General State Administration Public Procurement Plan, which sets the target for the procurement of electricity from 100 % fornovable origin in 2025, for all electricity consumption in the buildings and services of the General State Administration.

Bearing in mind that, in their current design, guarantees of origin do not guarantee new investments in renewable energy, consideration will be given to the possibility, with a view to the next Framework Agreement, of replacing the requirement for guarantees of origin with the introduction of mechanisms for the purchase of electricity of renewable origin with long-term purchasing agreements incentivising new installations, as well as innovative waysof, inter alia, setting up self-consumption generation systems in public buildings.

This line includes initiatives to generate and purchase renewable energy, such as theAena Thermal Plan – the public company managing airports of general interest in Spain – where solar photovoltaic plants are planned to be deployed with the objective of achieving 100 % energy supplyfrom its own renewable energy – this 100 % is now already covered by the purchase oftricity with guarantees of origin.

Adif and Adif AV are also developing an energy self-consumption plan based on the installation of photovoltaic plants on their own land, together with the use of roofs and markers of stations for thedeployment of photovoltaic installations. In total, with the planned actions, the installed capacity will amount to 27 MW and the energy generated is estimated at 35 GWh/year.

In order to make further progress on the decarbonisation path, it is necessary to promote similar objectives in the other public administrations, both regional and local, by disseminating information, model specifications and tenders and good practice manuals.

b) Objectives addressed

- Decarbonisation of the electricity supply of the General State Administration and the other public administrations.
- Promotion of new renewable energy installations.

c) Policy mechanisms

- Design and implementation of new 100 % renewable energy purchase framework agreements, as well as introduction of renewable self-consumption schemes in public buildings.

- Analysis of the design and implementation of centralised auctions for the long-term purchase of renewable electricity from new installations.
- Analysis of the potential of innovative public procurement (see Measure 5.5. Public Purchase of Innovative Technology (CPTI) and Pre-Commercial Technology (PPP) of this Plan) for the deployment of renewables in the public domain.

d) Responsible

Ministry of Finance and MITECO.

MEASURE 1.27. TRAINING OF PROFESSIONALS IN THE RENEWABLE ENERGY SECTOR

a) Description

The PNIEC, in Chapter 4 'Analysis of the impact of the Plan's policies and measures', estimates a net employment growth of 560.000 jobs in 2030 compared to the baseline scenario.

In 2012, IRENA already reported that the achievement of renewable energy commitments would lead to qualifiedprofessionals across the value chain, and identified the need to increase and improve the training of professionals in renewables as one of the main challenges in the sector. The effects of shortages and poor training of professionals result in a slowdown of the shortage, economic losses in projects and a worsening reputation for the technologies concerned.

Both new and existing professionals, together with professionals from other bodiesaffected by the just transition, need quality continuous training, enabling them to face the new challenges of future labour markets.

The energy transition process is unequivocally linked to the context of the digitalisation of eco, which makes it more necessary to update training plans to meet the new needs of professionals in the field of STEM (science, technology, engineering, mathematics) at all levels of education, university degree, master's degree and vocational training, so as to ensure adequate professional quality adapted to a labour market demand resulting from the implementation of the NECP.

In the 2022 Annual Report on Renewable Energy and Jobs62, IRENA points out that in order to make the energy transition a success,it needs to be addressed holistically within a broad policy framework including vocational education and training, labour market policies, diversity and inclusion strategies and regional revitalisation and social protection measures.

Training of professionals in the renewable energy sector is of particular importance in Spain, as it ranks among the top five countries in terms of employment per capita in the sector, as evidenced by aJRC in form63. Spain particularly highlights its contribution to employment in the wind and hydropower generation sectors, the production of biofuels and is a leading leader in heat pump technology and solar thermoelectric generation.

In order to identify new fields of employment and occupations, new skills and competencesrequired for professional practice and to develop a proposal for the creation of skills in line with theneeds of the green transition, the Biodiversity Foundation, together with the Spanish Climate Change Office, has drawn upthe study 'Employment and green transition. Employment sites, job transformation and training challenges in sectors related to climate change and biodiversity in Spain". This study identifies 40 strategic occupations, which will need to be created or reoriented in order to move, in the next decade, towards the green transition.

62 IRENA and ILO (2022), Renewable energy and jobs: Annual review 2022, International Renewable Energy Agency, Abu Dhabi and International Labour Organisation, Geneva

63 Czako, V., Employment in the Energy Sector Status Report 2020, EUR 30186 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-18206-1, doi: 10.2760/95180, JRC120302

It should be noted that the State and the Autonomous Communities are responsible for education matters,the ultimate responsibility for implementing legislation and implementation in their respective territories, where they are the education administration and, in addition, at present, much of the training is carried out in the companies themselves. The Plan initially proposes that the different levels of government work together with industry associations and trade unions to identify the profiles needed to comply with the Plan'smain objectives and subsequently promote the adoption of best practices to increase the training of deficit profiles in cooperation with the bodies concerned.

b) Objectives addressed

In anticipation of the deployment of new decarbonisation technologies, it is necessary to anticipate market demands and promote continuous training at the five levels of recognised professional qualifications, bearing in mind that the European Single Market requires training in professional skills that facilitatemobility in the EU. The aim is to:

- Improve training. Technology is progressing rapidly and there is a need for a process of adaptation and continuous improvement of the existing training offer, allowing for continuous updating of professional skills in order to maintain competitiveness in the labour market.
- Increase the supply of scientific and technological training, together with the development of skills and skills related to the green and environmental transition among professionals in the renewable energy sector, both in strategic and commercial positions and in technical positions, enhancing the requalification of workers in those sectors most vulnerable due to the energy paradigm shift or in retraining. The plan envisages new professional profiles related to technologies estimated to be a major take-off, but there is little market today, such as new energy storage systems, hydrogen technologies or offshore renewable energy. There is a need for the development and implementation of new degrees and specialities, at university level and at mid- and higher-level training course.
- Attracting new talent, facilitating access to new training opportunities. On the one hand, labour market opportunities will be disseminated and, on the other hand, mechanisms (scholarships, credits, etc.) will be put in place to enable those wishing to access them on equal terms. It is necessary to publicise the possibilities of having a career within the new decarbonised economy. A recent study confirms that the renewables sector represents an opportunity to attract especially female talent64.
- Adapt professional profiles to improve technical, safety and health and quality skills, and encourage the qualification and certification of installers of the different emerging technologies in line with the different Route Sheets published under the NECP umbrella.
- Training and improving the availability of qualified professionals for the installation, operation and maintenance of facilities and infrastructure in remote and low-accessibility areas for geographical reasons, with the dual objective of setting local employment and seizing the opportunity for renewable energy development.

c) Policy mechanisms

- Increase the qualification of national, local and regional staff responsible for management and processing procedures, as well as project promoters and project managers.
- Identification of the professional profiles needed throughout the value chain for the technologies associated with the development of the Plan.
- Matching skill levels with labour market needs resulting from the implementation of the NECP.
- Awareness raising, outreach and a special focus on female talent that drives the interest of more professionals on the job opportunities offered by the energy transition.

64 Education and training gaps in the renewable energy sector; LUCAS et al.; Solar Energy 173 (2018) 449 – 455.

- Training programmes on energy renovation and self-consumption.
- Training programmes and publication of specific guides on regulation, administrative processing and permit applications at local level.
- Training programmes for the provision of technical advisory services for citizen energisation and empowerment in general and for energy communities, in particular
- Support for the requalification of workers in vulnerable sectors or in transition to the green economy, in order to avoid the decapitalisation of areas in demographic depression.

  To help address the skills needs identified in the 'Employment and green transition' study. Employment sites, job transformation and training challenges in sectors related to climate change and biodiversity in Spain', the Biodiversity Foundation, as the Intermediate Management Body for the European Social Fund Plus (ESF +), through the 'EmployaGreen +' programme, launched a callfor aid in March 2024. This call aims to support projects for the acquisition or up-skilling of unemployed and female workers that address the challenges and skills opportunities linked to the 14 priority sectors identified in the study. In turn, it facilitates access to the labour market for participants and encourages reskilling andentrepreneurship. Private or public entities, whether profit-making or not, may be presented. It includes a line of exclusively training projects and another line combining training with the recruitment of participants.

d) Responsible

General State Administration (MITECO, IDAE, ITJ, Ministry of Education, Vocational Training and Sport, Ministry of Science, Innovation and Universities, National Institute of Qualifications (INCUAL), National Servicefor State Employment (SEPES), MCI), autonomous communities, local authorities, energy agencies, renewable sectoral associations, industry and service sector associations, training companies, trade unions and professional associations.

MEASURE 1.28. REVIEW AND SIMPLIFICATION OF ADMINISTRATIVE PROCEDURES

a) Description

The delay in implementing the projects means that their promotion is more expensive. There is a risk ofadministrative processing, linked to time limits or formalities that delay or create uncertainty in obtaining permits without necessarily bringing about improvements or guarantees of an environmental, social or adaptation nature to the territory.

Moreover, the current administrative procedures are generally not adapted and designed to cater for the deployment of hybrid installations where different renewable energy generation technologies co-exist that highlight the opportunities for integration in the territory brought about by new technologylogies or organisational models.

In conclusion, administrative procedures need to be reviewed with the aim of speeding up projects, while at the same time being able to consolidate and strengthen environmental and heritage protection and ensure adequate publicparticipation.

To be reviewed:

- The processing of projects for new renewable installations, including the alternative of hybrid projects affecting different renewable technologies, both for the installation of their generation into the grid and for partial self-consumption and contact points that improve communication and speed up the necessary procedures.
- Regulatory barriers or gaps that prevent local energy communities from participating in the system.

b) Objectives addressed

- Deployment of renewable energy onshore and offshore, including hybrid projects
- Deployment of decentralised generation (self-consumption and energy communities)
- Streamlining and clarifying administrative procedures for renewable projects
- Minimising the impact on the territory

c) Policy mechanisms

- Continuation of the opening of dialogue tables with the Autonomous Communities
- Identification of best practices in administrative processes at local, regional and state level that are clear, objective, effective and efficient and that bring value in ensuring the protection of the environment and the public interest and the adaptation of projects to territorial reality. This process should involve joint responsibility of all actors to ensure the development of renewable and equitable storage potential throughout the territory.
- **Update of administrative procedures**

  Administrative procedures will be adapted to include the processing of hybridisation projects with different renewable technologies. The administrative procedure for offshore electricity generation facilities from wind and ocean energy will also be adapted, with particular attention being paid to reducing processing times for testing platforms and R & D & I projects.

  In particular, the administrative framework for offshore renewable installations will be adaptedin accordance with measures 3.3 (Coordination of the framework for access and connection and new models for managing electricity grids) and 3.4 (Adequate the administrative framework for the authorisation of offshore renewable installations) of the 'Roadmap for the Development of Marine Wind Wind and Energy of the Sea in Spain' of December 2021.

- **Integration of renewables in the territory**

  Compliance with the renewable development targets set out in this Plan must be compatible with compliance with the rules on natural heritage and biodiversity. In any case,additional support will be given to me, such as the creation of sites for the conservation and promotion of indigenous biodiversity, with particular regard to species in vulnerable situations.

  To this end, MITECO will draw up a handbook of good practices to address or reduce the environmental and landscape impacts of renewable electricity generation and storage facilities involving the occupation of large areas of land, with precise recommendations on location, construction and integration, in order to preserve biodiversity, ecosystem services and landscape in a meaningful way.

  This action is further developed in Measure 1.1. Development of renewable energies compatible with biodiversity and the protection of ecosystems in this Plan.

- **Processing guide**

  In order to facilitate the implementation of the existing procedures for both developers and the various public bodies involved in them, IDAE will publish a guide uniting in a single doctoratethe different rules applicable to the processing of renewable energy projects, as well as rewardsand best practices. The document will make it possible to avoid procedural errors that require costly corrections in time, and to identify potential improvements for reviewing the procedures themselves.

- **Simplification of procedures**

  The administrative procedure for granting the permits required for the trickingand commissioning of production facilities using renewable energy sources will be speeded up, as well as for facilitating the repowering of existing installations, ensuring a simplified and rapid permitting procedure. In this regard, what is meant by a non-substantial modification shall be defined for the purposes of being exempted from the obligation to obtain prior administrative authorisation and construction authorisation,

pursuant to Article 53 (2) of Law 24/2013 of 26 December, when there are minor changes that do not have a new energy or environmental impact. This will further simplify the authorisation procedures for production facilities.

In particular, the administrative framework for offshore renewable installations will besimplified, as provided for in measure 1.3 (Framework*for* the replacement of experimental prototypes in offshore renewable energy testing platforms) of the 'Roadmap for the development of marine wind and marine energy in Spain' of December 2021.

- **One-stop-shop and simplification of formalities in demand-side management and renewable energy integration processes**

Current administrative authorisation processes may hamper the development of DSR. The existence of a one-stop-shop that can guide the applicant and act as an intermediary throughoutthe administrative application and permitting arrangement will reduce the difficulties and complexity of the processes linked to demand management and integration of renewable energy.

- **Specific authorisation for experimental projects**

Mechanisms will be developed for the administrative authorisation of experimental or test beds projects, such as those described in Measure 5.7. Legislative amendments to facilitate the research and innovation activity of this Plan, so that it is possible to authorise an envelope or conditions for thesurroundings that the project or the various elements tested in it must comply with, and which does not require fullprocessing when specific elements of the project are amended in accordance with the conditions laid down.

- **Establishment of contact points**

Contact points shall be designated, which shall guide and assist applicants throughout the entire process of solving andgranting authorisations by having to contact no more than one contact point throughout the entire pro cesanprocess. The contact point shall guide the applicant in a transparent manner throughout the administrative permit application process and a manual of procedures shall be made available to developers of renewable energy production plants.

Definition of priority areas for the implementation of renewable actions by the Communities hasgiven rise to simpler processes.

However, the measures relating to the simplification of administrative procedures and the definition of priority areas for carrying out renewable actions must not shorten the time needed to carry out the studies in order to gain adequate knowledge of the populations present and potentially affected by the projects, as well as of the use of the territory by the species, and to enable a proper environmental impact assessment to be carried out, in accordance with Law 21/2013.

d) Responsible

General State Administration, Autonomous Communities and local authorities.

MEASURE 1.29. KNOWLEDGE GENERATION, DISSEMINATION AND AWARENESS RAISING

a) Description

One of the challenges facing the Plan is the multisectoral approach to its actions, which, together with the rapid technologicalevolution associated with decarbonisation, and the dynamic environment for the fight against climate change, which ranges from local to multilateral action, is essential to implement tools and incentives topromote a flow of knowledge and information appropriate to all citizens on the progress of decarbonisation in Spain.

This measure aims to raise awareness among citizens and the public and private sectors of the need to address the decarbonisation process and to disseminate tools, technologies or practices for repurposing fossil energyconsumption, increasing the contribution of

renewable energy, reducing GHG emissions and harnessing the potential of carbon sinks.

In this regard, Article 35 of the LCCTE calls for the involvement of society to be promoted throughthe citation layer and the acquisition of responsibility and the conduct of awareness-raising and awareness-raising campaigns.

b) Objectives addressed

Proactive involvement of all actors in the energy transition.

c) Policy mechanisms

- **Knowledge generation**

  Data disaggregated by sex, objective and authoritative, qualitative and quantitative information, scientificallyvalidated, are of the utmost importance for decision-making, as well as for maintaining trust from both the sector and the general public. In the field of energy transition, MITECO, through IDAE or others in terms of values, will work with stakeholders in the sector to identify and overcome information gaps and promote studies and analyses of both the evolution and potential of energy technologies and other aspects associated with decarbonisation. In this regard, IDAE has set up the Directorate for Knowledge, Development of New Business Models and Competitiveness to boost knowledge generation.

- **Public awareness campaigns**

  Studies carried out by both the IEA and IRENA show that one of the barriers to advancing decarbonisation, and in particular renewable deployment and saving and efficiency measures, is the persistent lack of knowledge about these processes and points to the implementation of good communication practices as a tool to address this issue. The policy mechanisms considered include:

  - Activation of awareness-raising campaigns, targeting both women and men from both the general public and specific social and economicsectors, on decarbonisation, and in particular renewable deployment, as a key tool for combating climate change, theassociated socio-economic opportunities, as well as the beneficial health and quality of life effects of climate action.
  - MITECO, through IDAE, in full collaboration with MIVAU and MITRAMS and other instant tutional instruments, will maintain an adequate dissemination flow on key decarbonisation issues, such as renewable deployment, sustainable mobility and energy savings and efficiency, providing an overview of the need for and opportunities for climate action.
  - Information and awareness of the climate crisis and the energy crisis will be promoted. Along this lines, the Citizens' Climate Assembly has been set up to establish a social dialogue on the major issues involved in the green transition. It shall prepare a report of recommendations and proposals which shall be made public and serve for discussion at all levels of government, economic and societal actors.
  - More specifically, information on the energy rating of household appliances and buildings, on Low Emission Zones in municipalities, on low-emission means of transport and on self-consumptionissues will be promoted.
  - In this line, the various published Route Sheets (Marine Wind, Self-Consumption, Biogas, Hydrogen and Mineral Raw Materials) include measures on communication and awareness-raising campaigns, improving knowledgeto increase the involvement of social partners in exploring solutions with a long-term environmental and socio-economic vision, positioning Spain in holding conferences and forums forsectoral surveys, or designing public-private initiatives to improve the knowledge of society.

- **Information campaigns and sectoral training on energy and climate**

  Renewable energies, despite their huge potential for use, are still largely unknown in some sectors. There is a need to improve the information available on them, in particular to make the industrial and tertiary sectors aware of the benefits of their use.

Information and training campaigns may be organised through partnerships with the target sectors by concluding agreements between administrations, energy agencies, renewable sectoral associations, industrial associations, technological institutes, professional associations or associations of developers oftertiary buildings. Moreover, communication and information as well as training of professionals in the energy efficiency sector are specifically addressed in Measures 2.19. Training of professionals in the energy efficiency sector and 2.20. Communication and information on energy efficiency respectively.

In the past, information campaigns linked to the promotion of programmes for the development of renewable technologies in buildings and industries have had a significant impact in terms of improving userperception of the benefits of using these technologies. Those programmes had an image of their own which was linked to a quality control of the partner companies which sought to ensure the success of the operations carried out.

In this regard, the Guidance Guide for municipalities to promote self-consumption (IDAE, 2020) has been published.

The various published Route Sheets (Marine Wind, Self-Consumption, Biogas, Hydrogen and Raw Materials Raw MaterialsRales) include measures on the publication of general technical guidance, campaigns to raise awareness of economic, social and environmental potential and benefits.

- **Access to consumption information**

As stated in 'Measure 4.8'. Access to data from this Plan, the possibility for citizens and production sectors to access their energy consumption data easily and immediately, and to transfer this information to third parties, is necessary in order to exploit the energy management potential, the promotion of self-consumption and the development of new services that facilitate decarbonisation.

Article 23 of Directive (EU) 2019/944 (Data Management) states that European Union countriesshall specify the rules on access to final customer data, including metering and consumption data as well as data necessary for switching supplier, demand response and other services.

The deployment of smart meters is a key and necessary element for the digitalisation of the electricity system, also making it possible to make data available to the various participants in the medida with increasing quality and speed.

The Energy Storage Strategy published by MITECO includes a measure on boosting citizens' access to data.

- **Promoting carbon footprint calculation and reduction**

It will be promoted through different channels. One of the main measures is to encourage the participation ofSpanish organisations in the calculation of carbon footprint, compensation and voluntary carbon dioxide removal projects created in 2014 by Royal Decree 163/2014 of 14 March (in the process of amending it tobring it into line with Law 7/2021 of 20 May on climate change and energy transition). It will be promoted through training, dissemination and development of guides and tools. Other work streams include the inclusion of carbon footprint in public procurement, the calculation of the carbon footprint of ministerial departmentsand the promotion of calculation and reduction among Spanish municipalities. Finally, the possibility of promoting the calculation and recording of the carbon footprint for certain subjects will be explored.

- **Energy Communities as a communication tool for the energy transition**

The first pilot projects of energy communities will de facto be a tool for communication and implementation of cross-cutting renewable energy projects involving the direct involvement of their partners and members, as well as indirect participation of other community members or other interested actors. Among others, tools such as maps of energy communities in the national territory that make it possible to understand and get closer to their reality will be put in place.

(D) Responsible

General State Administration (MITECO, IDAE, MCI), autonomous communities, local authorities, energy agencies, renewable

sectoral associations, industry and service sector associations, training companies, trade unions and professional associations.

3.1.2. Sectors subject to emissions trading

Policies and measures in these sectors are covered by Directive 2003/87/EC ofthe European Parliament and the Council of 13 October 2003 establishing a system for GHG emission allowance trading within the Union and amending Council Directive 96/61/EC. The scheme, in operation since 2005, is in its fourth phase of implementation (2021-2030).

In Spain, the European Emissions Trading System (ETS) is governed by Law 1/2005 of 9 March 2007, currently under revision, and by various royal decrees implementing it. We are referringprimarily to Royal Decrees 18/2019, 317/2019, 1089/2020 and 203/2024. This scheme affects around **900 industrial and power generation installations in Spain, as well as almost 100 aircraft operators, of which 30 assets, and, since 2024, also some 450 shipping companies**.

In addition, Articles 27 and 27a of Directive 2003/87/EC have been implemented in Spain (through the Fourth Additional Provision of Law 1/2005), which allow small operatorsand hospitals to be excluded from emissions trading. In addition, in 2019, Royal Decree 317/2019 of 26 April was adopted, which establishes the mitigation measure equivalent to participation in the emissions trading system in the period 2021-2025. At present, just over 280 installations are affected by the exclusion schemes set out in Articles 27 and 27a mentioned above.

Another mechanism of the European Emissions Trading System that Member States have the option to implement or not is the one on indirect cost compensation. Indirect costs are referred to as those affecting industry as a result of the incorporation of the cost of the emission allowance into the electricity price. In Spain, Law 1/2005 provides in its sixth additional provision that the government may create a mechanismfor compensating indirect costs. This mechanism was established by Royal Decree 1055/2014 of 12 December. In the period 2021-2030, Royal Decree 309/2022 of 3 May applies. The aid granted under this Royal Decree is based on the European Commission's guidelines on state aid in this field (C (2020) 6400 final).

To date, eight calls for applications for aid have been processed, the last two of whichgive rise to costs incurred in the current period, 2021-2030. In the latter, EUR 244 million and EUR 228 million were allocated to compensate for the indirect costs incurred in 2021 and 2022 respectively. The 2024 General State Budget foresees the launch of a new call to compensate for the costs incurred in 2023.

For the period 2021-2030, i.e. 2021-2023, Spain has paid an annual average of around EUR 3.100 billion in the auctions of allowances. The use of these revenues is regulated by Law 7/2021 of 20 May on climate change and energy transition; more specifically, Article 30 (4). According to that provision, these resources should be used to meet climate change and energy transitionobjectives. The specific use to be made of the revenue must be specified each year in the General State Budget. No obs, EUR 450 million is expected to be used to finance the costs of the electricity system related to the promotion of renewable energies, that up to 30 % can be used for measures with a social impact related to the transition to a decarbonised economy or vulnerability to the impacts of climate change, and that up to 25 % of the revenues can be used to compensate for the effects of the indirect costs referred to above.

Finally, it is worth noting the reform of the EU Emissions Trading System as part of the Fit for 55 package, contained in Directive (EU) 2023/959, which extends this scheme to maritime transport since 2024 and to fossil fuels consumed in the buildings sector, the road transport sector and other additional sectors not covered by the current ETS since 2027, thus providing an economic incentive for cost-effective emission reductions in these sectors that have so far been difficult to decarbonise. This reform includes important developments to be implemented over the period 2021-2030. Furthermore, it associatesthis reform with the creation of a carbon border adjustment mechanism, governed by Regulation (EU) 2023/956 of the European Parliament and of the Council. This mechanism will tax the carbon content ofcertain products (iron and steel, fertilisers, cement, aluminium, electricity and hydrogen).

To 32 % GHG reduction in 2030 compared to 1990 levels, emissions trading sectors contribute a 70 % reduction compared to 2005.

The measures to be implemented in these sectors are set out in section 3.1.1 above, in the energy efficiency dimension and in the following measure:

MEASURE 1.30. EUROPEAN EMISSIONS TRADING SYSTEM

a) Description

GHG emissions from the power generation, basic industry and air transport sector will continue to be regulatedthrough the implementation of the ETS. Maritime transport has been incorporated into this existing regime with effect from 2024. In addition, Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 has established a specific emissions trading system for road transport, buildings and small industry, the emissions of which will be taxed from 2027 onwards. In order to mitigate the potential social and distributional impacts that the implementation of this new scheme may have, the establishment of the Social Climate Fund (SCF) has also been agreed by Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023, to which Measure 6.5 is dedicated. Just Transition Fund.

In Spain, the ETS is governed by Law 1/2005 of 9 March 2003, as well as by various royal decrees that govern theETS. This scheme affects around 900 industrial and power generation installations in Spain, as well as over 30 active aircraft operators and 450 shipping companies. Of the fixed installations, some 280 industrialinstallations are covered by the special schemes for small emitters and hospitals. GHG emissions under this scheme (stationary installations) accounted for around 33 % of the national total in 2022. In Spain, emissions from all the installations concerned had fallen by 59 % in 2023 compared with 2005, when the scheme began to apply. This highlights the important role played by this instrument as acentral measure of the European Union's climate change policy. They also have the capacity to generate public resources to finance other climate change policies. In this regard, the new Directive 959/2023/EU obliges Member States to give visibility to funding from the revenues from the auctioning of allowances, in order to make the public more aware of this type of benefits associated with this scheme.

The latest reforms introduced as part of the 'Fit for 55' legislative package are dueto take over from national legislation on 31 December 2023.

b) Policy mechanisms

Law 1/2005 of 9 March and Royal Decrees implementing it.

c) Responsible

General State Administration and Autonomous Communities.

3.1.3. Diffuse sectors

As stated in the section on objectives, this Plan addresses the policies and measures neededto tax the European target with a 32 % GHG reduction in 2030 compared to 1990 levels.

The emission reduction effort should be distributed between sectors subject to emissions trading (ge Electrical neration, refineries and large industries) and diffuse or non-ETS sectors, which in turn can be subdivided into:

- Energy diffuse (residential, commercial and institutional; transport, and industry not subject to emissions trading)
- Non-energy diffuse (agricultural and livestock, waste and F-gas management)

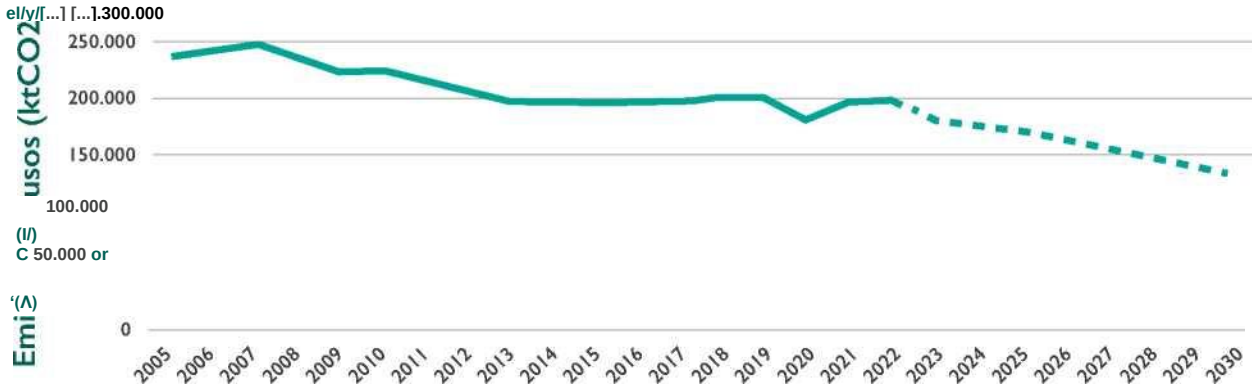
In addition to the computation of total gross emissions, GHG emissions and removals from land use, land use change and forestry should be considered.

Regulation (EU) 2023/857 of 19 April 2023 amending Regulation (EU)65 No 2018/842on binding annual reductions in greenhouse gas emissions by Member States from 2021 to 2030 contributing to climate action to meet commitmentsunder the Paris Accord, and Regulation (EU) 2018/1999 sets out the binding targets for each Member State to reduce GHG emissions from diffuse sectors in the period from 2021 to 2030. According to this, Spain should reduce its GHG emissions in diffuse sectors by at least 37.7 % by 2030 compared to 2005.

With the measures proposed in this Plan, the diffuse sectors as a whole will contribute tothe overall reduction in GHG emissions of 32 % in 2030 compared to 1990, with a reduction **in 2030 of around 42 % compared to 2005 levels**.

Within this group, the waste management, agriculture and livestock farming, and fluorinated gases (non-energy diffuse) sectors will contribute with a reduction in 2030 compared to their 2005 levels of approximately **26.6 %**, 18,6 **%** and **65.2 %** respectively.

Figure 3.1. Historical and projected diffuse emission path



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

That Regulation further defines the calculation methodology and the definition of a linear reduction trajectory to be applied to establish the annual emission allocations (AEAS) that each Member State may issue annually. The reporting cycle of inventory emissions and the amendments made to the Regulation mean that until now we only consider AEAS corresponding to the first five years of the period, i.e. the years 2021 to 2025. For the rest of the period, it is not yet possible to apply the methodology ondata invariated and verified for diffuse emissions.

The specific policies and measures in the **energy sectors** (both diffuse and ETS) are described in the sections on decarbonisation/renewables and energy efficiency dimensions.

In this regard, it should be pointed out that, as stated above, transport and **mobility make a significant contributionto the decarbonisation of the economy provided for in this Plan**, **reducing 34 $MtCO_2eq$** in the part corresponding to diffuse sectors between 2019 and 2030. Measures to decarbonise the transport sector are addressed in Chapter 3.1, together with measures on improving energy efficiency, addressed in Chapter 3.2, and in particular as regards **modal shift in private cars in urban environments**.

The identification and establishment of measures for **non-energy diffuse sectors** is presented below. In particular, the decarbonisation of the buildings sector is addressed through a full-life cycle measure, complementary to those already covered by Chapter 3.1.1 and

65 Regulation (EU) 2018/842 of the EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 on binding annual greenhouse gas emission reductions

those relating to energy efficiency in 3.2. In addition,measures are available for the agricultural and livestock sectors, the management of F-gases and waste.

In relation to the agricultural sector, account must be taken of the importance of the Common Agricultural Policy (CAP) andits unfettered impact on climate change mitigation. The **CAP for the period 2023-2027** has changed from a policy based on the description of the requirements to be met by final beneficiaries of support to a policy geared towards the sequestrationof concrete results, linked to three general objectives, the second of which is 'to support and strengthen the promotionof the environment, including biodiversity, and climate action and to contribute to achieving the Union's bio-and climate-related objectives, including commitments under the Paris Agreement'.

This CAP requires all Member States to have a CAP Strategic Plan indicating the cross-subsidiesor measures that aim to achieve the objectives of the CAP and the ambition of the European Green Deal. In this regard, Spain has Spain's CAP Strategic Plan (CAP Strategic Plan)[15], which is aligned with the National Air Pollution Control Plan[16] and the National Energy and Climate Plan (NECP)66.

The measures for reducing emissions in the agricultural sector contained in the NECP are listed below and those that are also part of the CAP Strategic Plan are indicated. It should be borne in mind that, in continuous cooperation with the Ministryof Agriculture, Fisheries and Food, these are monitored and a specific working group has been set up between MAPA and MITECO to improve this monitoring and quantification.

- Promotion of crop rotations on arable land (Measure 1.32. Reduction of GHG emissions in the agricultural and livestocksectors of the PNIEC and the Eco-scheme of the CAP Strategic Plan).
- Adjustment of nitrogen input to crop needs (Measure 1.32 of the PNIEC and RD for Sustainable Nutrition of Agricultural Soil)
- Frequent emptying of slurry in pig houses (Measure 1.32 of the PNIEC and RD laying down basic rules for the management of intensive pig farms and amending the basic regulations on themanagement of expansive pigs).
- Covering slurry ponds (Measure 1.32 of the PNIEC and RD laying down basicnation-based rules for intensive pig farms and amending the basic regulations governing extensive pig farms).
- Solid liquid separation of slurry (Measure 1.32 of the PNIEC and RD establishing basic rulesfor ordering intensive pig farms and amending the basic regulations governing extensive pig farms)
- Manufacture of compost from solid fraction of slurry Measure 1.32 of the NECP)
- Use of woody crop pruning residues as biomass (Measure 1.33. Reduction of GHG emissions in the waste management of the NECP)
- Promotion of conservation agriculture (direct sowing) (Measure 1.36. Agricultural sinks from the PNIEC and Eco-regí ofthe CAP Strategic Plan)
- Maintenance of plant cover and incorporation of pruning remains into the soil in woody crops (Measure 1.36 of the PNIEC and Eco-schemes of the CAP Strategic Plan)
- Energy efficiency in farms, irrigation communities and agricultural machinery (Measure 2.14 of the NECP)
- Development of biogas and biomethane (Measure 1.15 of the NECP)

66National Energy and Climate Plan (NECP)

- Energy efficiency in farms, irrigation communities and agricultural machinery (Measure 2.14 of the NECP)

15 Spain's CAP StrategicPlan (CAP Strategic Plan)

16 National Air Pollution ControlPlan

• Within the framework of the Common Agricultural Policy (Measure 6.6. The Social Climate Fund of the NECP) covers eco-schemes and agri-environmental commitments under the CAP Strategic Plan that have an impact on the reduction of greenhouse gas and other pollutant emissions, as well as on increasing removals. These measures are listed below:

  – Carbon farming and agroecology: Extensive grazing, mowing and biodiversity on pasture areas
  – Carbon farming and agroecology: Rotations and direct sowing on arable land
  – Carbon farming: Inert green roofs and roofs in woody crops
  – Agri-environmental commitments in agricultural areas. Commitments to promote and sustainably manage pastures.
  – Agri-environmental commitments in agricultural areas. Practices for soil improvement and combating erosion
  – Agri-environmental management commitments in organic farming
  – Support for non-productive investments on agricultural holdings linked to mitigation – adaptation to climatechange, efficient use of natural resources and biodiversity
  – Support for productive investments in agricultural holdings linked to climate mitigation –adaptation, efficient use of natural resources and animal welfare
  – Aid for investments with environmental objectives in the processing, marketing or development of agri-food products, for investments in improving energy efficiency primarily for environmental purposes, in the recovery of waste and materials of agricultural origin to increase energy self-sufficiency and for the uptake of renewable energy sources in industry
  – Aid for investments in irrigation infrastructure with environmental objectives, promoting the use of renewable energy sources and improving the energy efficiency of installations

In addition, it should be borne in mind that, as mentioned above, the Ministry of Agriculture, Fisheries and Alihas drawn up specific regulations for the management of the livestock sectors67 and in relation to thereduction of fertilisation through the Royal Decree on Sustainable Nutrition on agricultural soils68. As regards the timing of the measures, given that they are linked to the CAP, they have started to be in force since 2023 and will be reviewed annually. It should be borne in mind that the agricultural sector provides for a number of other mitigation measures whose emissions are not accounted for in the agriculture chapter but in that of sinks, transport or energy.

MEASURE 1.31. LIFE CYCLE ASSESSMENT OF BUILDINGS

a) Description

In 2022, final energy consumption in the building sector was 39.5 % at European Union level and 30.6 % at national level. In terms of greenhouse gas emissions of energy origin, the sector was responsible for 15.4 % at EU level and 11 % at national level69. This measure aims to provide a comprehensive approach to decarbonising the stock of residential, commercial and institutional buildings through the life cycle analysis (LCA) of buildings. To this end, two types of emissions in buildings are distinguished: operational carbon and embedded carbon.

Operating carbon corresponds to the greenhouse gas emissions associated with energy addedduring use of the building in order to maintain it in optimal conditions for the performance of its functions or habitability. Includes energy use in heating, cooling, domestic

67 Sectoral planning
68 Royal Decree 1051/2022, of 27 December, laying down rules for sustainable nutrition in agricultural soils
69 Energy data source: Eurostat Comprehensive EnergyBalances
National emission data source: Report on the National Inventory of Greenhouse Gas Emissions, 2024 Edition (1990-2022)
Source of European emissions: European Environment Agency's greenhouse gas emissionsviewer

hot water, kitchen, lighting and household appliances in general. At this point it is necessary to differentiate between new and existing buildings. Newly built buildings must meet increasingly demanding energy efficiency standards. According to Directive (EU) 2024/1275 on the gene efficiency ofbuildings, adopted as part of the Fit for 55 package, only Zero Emission Buildings (ZEB) may be built from 2030, bringing this obligation forward to 2028 for publicly owned buildings. For its part, the reduction of emissions during the use phase in buildings already built is implemented in the measures of this Plan dedicated to improving energy efficiency in existing buildings, in application of the energy efficiency first principle. It should be borne in mind that more than half of themain dwellings were built before 1980, thus predating the first legislation that introducedminimum requirements on thermal conditions in buildings. This is why most of the effort to reduce energy consumption and emissions from buildings should be devoted to existing buildings.

On the other hand, embedded carbon refers to greenhouse gas emissions associated with the production of materials, construction, use, renovation and end-of-life of the building. This concept allowsin a single analysis all the life cycle emissions of the building by taking into account not only the emissions due to their energy consumption, but also all emissions related to activities both prior to the commissioning of the building through construction activities, known asinitial carbon, and from the activities of maintenance, repair, replacement, renovation and dismantling of the building, resulting in embedded carbon. According to Directive (EU) 2024/1275 on the energy performance of buildings, from 1 January 2030 the energy performance certification of newly constructed buildings should include the Calentamiento Global Potential indicator. This obligation is brought forward to 1 January 2028 for buildings with useful floor area over 1.000 m².

This approach is highly complex when it comes to taking into account the emissions of each activity, and proper traceability and accounting for these emissions must be maintained. Therefore, the first step should be to establish an appropriate methodology and register to provide the necessary information to facilitate citations aimed atachieving the decarbonisation of the stock of new and existing buildings. In this regard, Law 7/2021 of 20 May 2003 on climate change and energy transition establishes the need to determine the type of companies that will have to calculate and publish their carbon footprint. This obligation will be laid down by regulation through the amendment of Royal Decree 163/2014 of 14 March 2007 creating the carbon footprint register, compensation and carbon dioxide removal projects, the project of which has already been subject to publictraining.

b) Objectives addressed

The ultimate objective of this measure is to achieve emission reductions in the buildings sector by establishing a methodology for analysis throughout their life cycle in order to make the most efecand efficient decisions for the decarbonisation of the fleet, applying a holistic approach encompassing all possible actions that contribute to achieving the objectives. In this way, the Plan sets out the following priority to first reduce the energy needs of the building and subsequently reduce its emissions through the integration of renewable energy:

- Reduction of energy needs through the construction of buildings with the lowest carbon footprint possible or instead renovations of existing buildings, especially of the thermal envelope of buildings using in any case materials with the minimum carbon input possible, promoting the sustainability of raw materials and the recyclability of products used in the construction or renovation of buildings.
- Replacement of inefficient equipment and use, when installing or replacing building equipment, of more efficient and low-carbon equipment.
- Integration of renewable energy in buildings.

This measure helps to comply with Article 8 (2) of the LCCyTE, which states that 'the building materials used in both the construction and renovation ofbuildings shall have the lowest carbon footprint possible in order to reduce total emissions for the whole action or building.'

c) Policy mechanisms

† **Development of the regulatory and regulatory framework**

A system for the calculation of the carbon footprint of buildings throughout their life cycle will be progressively established, in coherence with regulation at European level. This development will be incorporated into the Technical Building Code in a manner consistent and coordinated with the Carbon Footprint, Compensation and Carbon Dioxide Removal Projects Register.

The aim of this system is to provide an information system to develop monitoring of the carbon footprint of buildings, and ultimately, in accordance with European legislation, to set limits onthe carbon footprint of buildings, where appropriate. This analysis should place particular emphasis on those activities that may be subject to double regulation because they are subject to the ETS.

This NECP therefore proposes to put in place all the necessary measures to give visibility to thetotal emmissions of buildings, so that the sum of the carbon consumed and the operational carbon count these emissions from the production of the raw materials that make up their materials to the disposal of the waste produced during their dismantling. In practice, the decarbonisation of the building sector will entail the decarbonisation of its entire value chain and all related activities, affecting other sectors such as industry, construction and transport, among others. In termsof definition, the decarbonisation of buildings must be aligned with the decarbonisation of the rest of the economy.

d) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be coordinated by the MIFTECO, as responsible for the National Emissions Inventory and the Carbon Footprint Register, Compensation and Absorption of Carbon Dioxide Projects and the MIVAU as responsible for housing, architecture and building policy, together with the Autonomous Communities.

MEASURE 1.32. GHG EMISSION REDUCTION IN THE AGRICULTURE AND LIVESTOCK SECTORS

a) Description

As regards agriculture and livestock farming, Spain has addressed the mitigation of emissions from this sector through various closely related measures, and in collaboration with the Ministry of Agriculture,Fisheries and Food (Ministerio compe tente). Thus, in addition to this measure 1.32. reducing GHGemissions in the agricultural and livestock sectors, which focuses specifically on agriculture and livestock, mitigation of this sector is carried out through another specific measure to activate the sink effect of agricultural soils (Measure 1.36), of the new CAP Strategic Plan (Measure 6.7 Common Agricultural Policy), through the promotion of bioenergy production (with pruning wood waste; production of biomethane and biogas) and compost production (Measure 1.33), as well as through my efforts toimprove energy efficiency in farms, irrigation communities and agricultural machinery and in the fisheries sector (Measures 2.14 and 2.15, respectively). Finally, it should be noted that the Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition included in Measure 5.12 also include State aid to improve the energy efficiency of former agriculturalplots, as well as for the generation of energy from renewable sources, in particular biogas and agricultural biomass.

The gross emissions from the agricultural sector reported in the National Inventory totalled 2022 ktCO34.863-eq in$_2$, representing 11.9 % of the total.

The actions identified for measure 1.32 of the agricultural and livestock sectors are described below.

A.1. Promotion of crop rotations on arable land

This measure consists of promoting rotations on arable land, including improved species, with a percentage of legumes, and replacing monoculture.

Arable crops are often part of the rotations that have been used traditionallyto preserve and maintain soil fertility, to improve the control of pests, diseases and weeds, and to maintain a certain degree of moisture in the soil. The introduction of leguminous species inrotations implies an improvement in nitrogen levels in the soil, improving its structure and fertility, which means that subsequent crops need less nitrogen fertiliser input.

Therefore, the cultivation of leguminous crops has a positive effect on climate change mitigation, resulting in lower emissions associated with the use and production of such fertilisers. Moreover, from the point of view of adaptation to climate change, it increases the resilience of soil and crops and is therefore an appropriate adaptation measure, especially in non-irrigated systems.

A.2. Adjustment of nitrogen input to crop needs

The proposed measure consists of the development of a fertilisation plan that takes into account the needs of the crop, so that organic and inorganic fertilisers are used at the appropriate doses and times.

The fertilisation plan shall be drawn up in accordance with the principles of Royal Decree 1051/2022 of 27 December. Further, the use of manure and slurry will be promoted in accordance with the aforementioned Royal Decree, which falls within the scope of the Circular Economy Strategy by including them again in the production chain.

The reduced emissions are nitrous oxide (N_2O) and ammonia (NH_3) emissions due to inappropriate fertilisation.

A.3. Frequent emptying of slurry in pig houses

The measure consists of the frequent emptying of pits located below the confinement sites in pig facilities. Frequent depopulation is considered to be the one that takes place at least once a month. The reference technique consists of emptying the pits at the end of the phase or when they are full. This frequent emptying reduces emissions of NH_3, CH_4 and N_2O.

These improvements in the handling of slurry and manure in housing for the different categories of pigs and cattle result in a reduction in emissions within the housing.

A.4. Slurry pond covering

This measure consists of covering slurry ponds in the new pig and bovine installations,forming at least the conditions set out in the corresponding and respective Royal Nation Decreesof both sectors and with a monitoring of those measures to enable the quantification of emission reductions and the design of complementary measures and incentives.

It shall be taken into account that the amount of methane generated by a specific manure management system is affected by the extent to which the anaerobic conditions, the temperature of the system and the retention time of the organic material in the system are present.

The total covering of slurry ponds reduces NH_3 emissions and odours by more than 90 %.

A.5. Solid liquid separation of slurry

The proposed measure consists of solid-liquid separation of slurry with subsequent storage of solids and issprayed from the liquid fraction into uncovered anaerobic lagoons in areas of high livestock concentration (pigs and cattle). This liquid fraction shall be used for irrigation, taking advantage of its fertilising value.

Solid liquid separation, as well as better manure management, facilitatesafter-treatment and reduces GHG emissions.

The storage of the solid fraction has a lower methane conversion factor (MCF) thanthe storage of liquid manure, and the resulting liquid fraction has a lower amount of volatile solids compared to the original one, thus reducing methane emissions.

A.6. Manufacture of compost from solid fraction of slurry

The proposed measure is the production of organic fertiliser (compost) from pig and cattle manure in areas of high livestock concentration.

In composting, the action of aerobic bacteria oxidises ammoniacal nitrogen, thereby reducing the Emisium nesof NH_3. In addition, this process allows the stabilisation of residues through aerobic fermentation that generates CO_2 (which is not taken into account in the final balance as it comes from biomass) and small quantities of CH_4 and N_2O, compared to other techniques that generate more

GHG.

Compost produced is an organic soil improver that improves soil fertility and characteristics, as it helps to fix carbon in the soil.

Measures shall also be taken to reduce the burning of stubble in order to reduce the harmful health effects of the emission of particulate matter.

b) Policy mechanisms

MAPA regulatory measures or interventions in the Common Agricultural Policy Strategic Plan (CAP Strategic Plan).

The Ministry of Agriculture, Fisheries and Food has drawn up specific legislation for the management oflivestock plants and in relation to the reduction of fertilisation through the Royal Decree on Sustainable Nutrition on agricultural soils.

c) Responsible

Map, together with the Autonomous Communities according to Spain's distribution of competences.

MEASURE 1.33. REDUCTION OF GHG EMISSIONS IN WASTE MANAGEMENT

a) Description

The waste sector has made good progress since the adoption of the National Energy and Climate Plan 2021-2030, creating a framework more conducive to achieving the objectives set. The gross emissions from the waste sector collected in the National Inventory amounted to a total of 14.732 ktCO2-eq$_{in}$2022, 1.9 % of the total and a 1.9 % reduction compared with the previous year.

- This progress was largely due to the adoption of the following regulatory and planning instruments: Law 7/2022 of 8 April 2007 on waste and contaminated soil for a circular economy70, which transposes into national law two EU waste legislation: Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste and Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment. It also reviews and updates the legal framework applicable to the production and management of waste in Spain.
- Royal Decree 646/2020 of 7 July 2006 regulating the disposal of waste by landfilling. This rule emphasises and reinforces the pre-treatment of waste, particularly municipal waste, resulting in a decrease in the quantities of GHG emitted from landfilling facilities. Furthermore, the explicit accounting of GHG emission costs in the costs of landfilling waste is introduced as a novelty, giving a finalistic character to the amounts collected to be used for programmes to strengthen gas collection and treatment systems and for the strengthening of monitoring and control networks. In January 2024, Order TED/789/2023 of 7 July entered into force, and the recovery of the amounts in this respect began.

70Boe.es – BOE-A-2022-5809, Law 7/2022 of 8 April on waste and contaminated soils for a circular economy.

- The Spanish Circular Economy Strategy Spain 203071, adopted on 2 June 2020, as a key element in promoting a genuine circular economy that contributes not only to achieving an environmentally sustainable, decarbonised and resource-efficient economy, but also strengthens the supply chain, increasing resilience and enhancing strategic autonomy in coherence with the European Green Deal itself and the EU's Second Circular Economy Action Plan.

  The Strategy has set a number of targets for the year 2030, including a 30 % reduction in thenational value of materials relative to GDP compared to 2010, a reduction inwaste incineration by 15 % compared to 2010, a reduction in the generation of food waste along the food chain, an increase in re-use and preparation for re-use to 10 % of municipal waste generated, a 10 % improvement in water use efficiency, and a reduction in greenhouse gas emissions from the waste sector below 10 $MtCO_2eq$. Six sectors are identified for this purpose(construction, industry, consumer goods, agri-food, tourism and textiles).

  The Strategy is implemented through successive **three-year action plans**, the first of which is the forerunnerfor the period 2021-202372. The plan contains 116 measures prepared by eleven ministries with theaim of forming a coordinated and complementary response which reinforces each of the individual measures proposed to achieve the objectives set for 2030 and which in turn remains consistent with the initiatives and policies undertaken at Community level. It is structured in several Priority Axes: Production,consu, secondary raw materials, waste management, water reuse and treatment and three cross-cutting axes to address R & D & I, participation and awareness raising, employment and training. The following three-year plans will be approved in 2024 and 2028.

These new regulations are accompanied by other sectoral regulations, for specific waste streams, which have been approved in recent months and aim to improve the management of certainsiduous streams, which will undoubtedly also lead to GHG emission reductions. Examples of this are the approval of Royal Decree 553/2020, of 2 June, regulating the shipment of waste within the territory of the State; Royal Decree 731/2020 of 4 August amending Royal Decree 1619/2005 of 30 Decemberon the management of end-of-life tyres; Royal Decree 27/2021 of 19 January 2007 definingRoyal Decree 106/2008 of 1 February 2003 on batteries and accumulators and the environmental management of their waste and Royal Decree 110/2015 of 20 February on waste electrical and electronic equipment; Royal Decree 265/2021 of 13 April 2006 on end-of-life vehicles and amending the General Vehicle Regulation; and Royal Decree 1055/2022 of 27 December on packaging and packaging waste. This circulareconomy package is complemented by other accompanying legislation.

Another element that is contributing to significantly accelerating progress in the implementation of waste policy and the implementation of the integrated National Energy and Climate Plan 2021-2030 is the PRTR, submitted in June 2021. The PRTR includes Component 12 "Spain's industrial policy 2030", which aims to lay the foundations for a more modern and competitive industry that definitively incorporates the climate and environmental vector, amongthe measures included in this component, in the area of circular economy and waste, it should be noted that:

- Reform C12.R2 'Waste policy and boost the circular economy', which includes all the regulatory and planning elements mentioned above.

- Investment C12.I3 'Plan to support the implementation of waste legislation and the promotion of the circular economy', which aims to contribute to the promotion of the circular economy in Spain, by financing projects aimed at implementing the national waste regulatory framework and achieving EU waste targets, as well as innovative circular economy projects in the private sector to facilitate the transition to the circular economy.

22

23

In addition, as part of the forecasts for this component, mainly its investment was submitted in March 2022 the PERTE for the Circular Economy, which will give a definitive impetus to the incorporation ofthe circular economy into Spanish industry. The PERTE comprises a total of 18 instruments distributed over 2 Action Lines:

- Line of Action 1: Actions on key sectors: textiles, plastics and equipment for renewable energy, where support includes, for

Spanish Circular EconomyStrategy
I Circular Economy Action Plan 2021-2030

example, in the case of plastics, those aimed at chemical recycling, aimed at treating non-mechanically recyclable fractions.

- Line of Action 2: Cross-cutting action to boost the circular economy in business

Below is a description of the actions identified for the waste sector, which, as a whole, constitute a measure included in the WEM or baseline scenario and WAM scenario or Objective Scenario of this first revision of the 2021-2030 NECP. For the implementation of these measures, investment C12.I3 of the Spanish PRTR has been designed, as mentioned above, with most of it (around EUR 600 million) being allocated to the implementation of measures to improve the management of municipal waste, in particular bio-waste.

A.1. Home or community composting

This is the separation at source of bio-waste or organic fraction of municipal waste (FORU) for re-cyclingon *site*, by home or community composting. The measure is aimed at families, schools orlandlords, in rural, semi-urban and urban areas.

The implementation of the measure involves the distribution of composters among the target population, as well as an awareness/training campaign in the households and communities involved to ensure the success of the measure. As a result, bio-waste is prevented from being sent to the landfill, the collection frequency of the remaining fraction is reduced and good quality compost is obtained.

A.2. Separate collection of bio-waste destined for composting

This measure targets mainly semi-urban environments and parts of urban environments. It targets the total amount of the population's organic matter and vegetable remains – from both households and large producers – that are landfilled.

The measure was implemented by means of Law 7/2022 of 8 April on waste and polluted soilsfor a circular economy, Article 25 of which establishes the mandatory separate collection of bio-waste from households by 30 June 2022 for local authorities with a population of more than 5 000 inhabitants, and by 31 December 2023 for the rest.

Article 28 of the Law also requires local authorities, in particular those with a populationof less than 1.000 inhabitants, to take the necessary measures to separate and recycle bio-waste at source by means of home and community composting, or by separate collection and subsequent transport and treatment in specific recycling facilities, primarily composting and anaerobic digestion, or a combination of the two. Similarly, Article 26 of the Law sets out the minimum targets for preparation forre-use, recycling of municipal waste to be achieved by 2025, 2030 and 2035, respectively: 55 %, 60 % and 65 %.

A.3. Separate collection of bio-waste destined for biomethanisation

This involves implementing a system for the separate collection of bio-waste, although in this case it would be sent to a biomethanisation plant to be used as biofuel. The target population is predominantly urban, as plants with a capacity of more than 40.000 t/a are estimated.

In this case, there are two aspects, one of which is the same as the previous ones, due to a reduction in the frequency of collection and the avoidance of bio-waste in landfill, and on the other hand the savings from the use of renewable energy, linking it to measure 1.15. Development of biogas and biomethane.

As in action a.2. Law 7/2022 lays down mandates on the deadlines for the implementation of separate rereception, the objectives to be achieved, and the involvement of local authorities.

A.4. Reduction of food waste

This measure forms part of the actions to prevent waste generation. At international level, the Sustainable DevelopmentBOs are covered. SDG 12.3 aims to halve per capita global food waste at retail and consumer level by 2030 and reduce food losses along production and supply chains, including post-harvest losses.

The EU has created a platform to work towards this target, and it also appears in the EU Action Plan for the Circular Economy.

At national level, MAPA quantifies annually the amount of food thrown into litter through the Panel for the Quantification of Food Waste in Households, 1.1704 million tonnes in 2022.

Once the national strategy on 'More Food, Less Waste' expired in 2020, the next step to tackle the problem of food waste was the drafting **of the draft law on the prevention of food losses and food waste**, which aims to establish a model of good practices to prevent food waste through action throughout the food chain, from the origin of the pro-harvestprocess, to consumption habits in households and in catering. Among other measures, it establishes that all actors in the food chain must have a prevention plan to prevent waste, and sets a mandatory hierarchy of priorities, the first being use for human consumption, through donations to non-profit businesses or food banks. The draft law was adopted by the Council of Ministers on 9 January 2024 and is currently under parliamentary procedure.

Furthermore, Article 18 of Law 7/2022 of 8 April on contaminated waste and soil for a circular economy is in linewith our legal system, the objective of achieving a 50 % reduction in food waste per capita at retail and consumer level and a 20 % reduction in food losses along production and supply chains by 2030 compared to 2020, as a contribution to the United Nations Sustainable Development Goals. To this end, the State Waste Prevention Programme will include a specific section on the reduction of food waste, including the generalguidelines to be taken into account by the various operators involved and the actions and work lines to be carried out by the various public administrations within their remit. It is also consistent with the recent COM proposal to incorporate specific targets in this area by amending the Waste Framework Directive.

A.5. Increase of separate collection of paper in the municipal channel

This measure consists of increasing the collection and recycling of paper in the municipal channel (households, smalleating, HORECA, buildings, banks and offices, etc.). Paper, although in general terms can be considered as an organic fraction of municipal waste, should be considered separately for several reasons: it has its own collection channel, its greatest potential for separate collection and recycling and has a target emitting potentialno higher than bio-waste.

Reductions are achieved by preventing waste paper from going to landfills. In addition, there are reductions arising from the use of recycled pulp instead of virgin pulp.

Although separate collection for paper already existed, Article 25 of Law 7/2022 of 8 April on contaminated waste and soil for a circular economy expressly includes paper as one of the waste fractions for which local authorities must establish separate collection.

A.6. Increase of separate collection of used domestic cooking oil

Used cooking oils are valuable as a secondary material for the production of biodiesel or other Biocombustibles. Thus, this measure not only contributes to the reduction of emissions resulting from its inadequate management, but also brings other benefits, such as contributing to the renewable energy targets and the specific target for renewable energy in transport and reducing the risk of water and aquifer pollution.

The measure focuses on separate collection of oil from households, as in hospitality it has a sufficient degree of implantation. The local councils would be in charge of implementing a collection model that is suitable for their municipality.

A.7. Increase of separate collection of textiles

Textiles account for 6 % of the remaining fraction that is landfilled in Spain, and half arenatural fi. Although part of this waste stream is already separately collected for reuse and recycling, concerns about textile waste have led the EU to establish a separate collection obligation for this material. This obligation is laid down in Article 25 (2) (c) of Law 7/2022, which establishes the mandatory separate collection of textile waste of local competence by 31 December 2024. This measure is consistent with Community policy, reflected in the EU Strategy for Sustainable and Circular Textiles and with the recent European Commission proposal to address extended producer responsibility in this area, through an amendment to the Waste Framework Directive.

The measure consists of the separate collection of used clothes and textiles by means of street containers orother tails for reuse and recycling of all types of fibres, avoiding landfilling, where natural fibres emit methane as a result of their decomposition. In many cases, the implementation of thesemeasures is also associated with other benefits of social interest.

A.8. Management of depleted biogas in sealed landfills

During a significant historical period, waste management in Spain has been landfilling, meaning that there is a significant asset in landfills sealed in accordance with the regulations, which lays down the conditions for capturing the biogas generated, but where there is still a considerable amount of biogas leaks. In these cases, it is proposed that the surface of the landfill be covered with what is known as an oxidising cover soil, which contains methanotrophic bacteria that can oxidise the methane that passes through it. Various methods currently exist that can be adjusted to the characteristics of the landfill requiring attention. The measure consists of applying oxidising covers to the surface of the target landfill sites, estimating an oxidation ratio per surface, witha servator, based on studies and projects in the field.

A.9. Use of woody crop pruning residues as biomass

This measure consists of using pruning residues as biomass in the form of pellets or chips for use in heat or cogeneration in both the residential and industry sectors, which will replace fossil fuels, linking with measure 1.21. Specific programmes for biomass harvesting.

Olive groves and vineyards are considered mainly because of the larger area of cultivation and pruning, in size and volumen, which it originates.

In addition, the extension to other crop residues will be considered, taking into account their different uses, whether forfeeding purposes, for the enhancement of soil organic carbon, or for use as biomass.

This measure also entails a significant reduction in particulate matter, thus contributing tothe National Air Pollution Control Programme.

Spain's CAP Strategic Plan (CAP Strategic Plan) includes, through the second pillar interventions financed by the EAFRD, the intervention '6842.1 – Support for investments with environmental objectives in processing, tradingor developing agricultural products', which co-finances investments aimed at reducing GHG emissions, inter alia, in the processing of agricultural biomass for energy production. In addition to the abovenational intervention, a total of seven Autonomous Communities have programmed the implementation of this intervention in their territory.

b) Policy mechanisms

The main mechanisms are regulatory and planning instruments discussed in the description of the measure:

- Article 25 of Law 7/2022 of 8 April on waste and contaminated soil for a circular economy provides for the separate collection of bio-waste from households by 30 June 2022 for local authorities with a population of more than 5 000 inhabitants, and by 31 December 2023 for the rest. The law also introduces landfill and incineration taxes, among others that will help minimise such management options, and generally does not allow the burning of plant waste generated in the agricultural or forestry environment.
- Royal Decree 646/2020 of 7 July regulating the disposal of waste by landfilling transposing the restriction on landfilling of separately collected waste fractions laid down in Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste. As a novelty, it includes the costs associated with the issuance of EIGs among the costs of landfilling, which will be aimed at strengthening and improving gas collection and treatment systems.
- Regulation (EU) 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down the requirements to be met by compost or digested in order to be considered as a fertiliser.
- Draft Law on the prevention of food losses and food waste, which aims to establish a model of good practice to prevent food

waste through actions throughout the food chain, from the origin of the harvesting process itself, to consumption habits in households and in catering. Among other measures, it establishes that all actors in the food chain must have a prevention plan to prevent waste, and sets a mandatory hierarchy of priorities, the first being use for human consumption, through donations to non-profit businesses or food banks.

- Order TED/426/2020, of 8 May, establishing the criteria for determining when recovered paper and board intended for the production of paper and cardboard ceases to be waste under Law 22/2011 of 28 July 2003 on waste and contaminated soil.
- Measures related to agricultural biomass included in Royal Decree 948/2021, of 2 November, establishing the regulatory bases for granting State aid for the implementation of investment projects as part of the Plan to boost the sustainability and competitiveness of agriculture and livestock farming (III) under the Recovery, Transformation and Resilience Plan.
- Other end-of-waste or by-product declarations ministerial orders deemed to be applicable.

The financial instruments contributing to the implementation of the measures are:

- PRTR Component 12 “Spanish Industrial Policy 2030”.
- Reform C12. R2 “Waste policy and boost the circular economy” in the context of which the PERTE in the Circular Economy has been developed.
- Investment C12.I3 “Plan to support the implementation of waste legislation and the promotion of the circular economy”
- Waste aid via Environmental Promotion Plans (PIMA) and the National Waste Management Framework Plan (PEMAR).
- Other MAPA regulatory measures or interventions in the CAP Strategic Plan.

c) Responsible

Map and MITECO jointly with the Autonomous Communities and local authorities in accordance with Spain’s distribution of powers. As a result of its division of powers, Spain has various coordination bodies between administrations and with economic operators, in order to strengthen cooperation between administrations, both at the stage of adoption of the rules and at the implementation stage. These include the CCPCC, the CAMA, the Sectoral Conference, etc. Furthermore, for the specific area of waste, there is also aCommittee on Waste Collaboration, governed by Article 13 of Law 7/2022, in order to ensurecoordination and cooperation between the various administrations.

MEASURE 1.34. REDUCTION OF GHG EMISSIONS RELATED TO F-GASES

a) Description

In 2022, the F-gas sector accounted for 1.9 % of the emissions listed in the National Inventory, mainly from the refrigeration and air conditioning sub-category.

A.1. Replacement of installations using high global warming potential (GWP) fluorinated gases with other installations using low or zero GWP gases

It consists of replacing equipment using HFC with high warming potential (notably cooling/air-conditioning equipment) with alternative equipment using zero or low heating potential refrigerant gases (CO_2, NH_3, hydrocarbons or low global warming potential fluorinated gases such as HFO). It is a measure that acts on the existing total HFC bank and drives the deployment of other technologies with environmentally more favourable alternatives.

A.2. Reduction of HFC emissions through actions in existing installations using HFCs

It consists of reducing existing installation emissions through measures that reduce HFCs emissions associated with leaks of this equipment. The measures are the implementation of periodic checks, automatic leakage control systems, '*retrofit*', conversion of existing installations from high warming potential F-gases to other low GWP F-gases compatible with the installation, as well as closure of fashioned fri furniturein commercial refrigeration establishments that reduce the load of F-gases used.

A.3. Recovery and management of F-gases at the end of life of equipment

It consists of the recovery and subsequent management of F-gases at the end of life of the equipment using them, prioritising the regeneration and recycling of gases over their destruction. Recovering the refrigerant gas and properly managing it prevents the entire load from being emitted into the atmosphere.

A.4. Promoting the use of low global warming potential refrigerants

It consists of the revision of the safety standards for cooling and air-conditioning that will allow greater use of slightly flammable low GWP A2L refrigerants (such as R32 and HFO) and A3 refrigerants with zero GWP (such as R290) especially in the sector of air-conditioning and domestic heat pumps.

A.5. Encouraging the reduction of the use of SF6 in electrical switchgear

It is about promoting the transition to equipment that uses alternatives to SF6 and that has no or low global warming potential, prioritising new installations and those that need to be modified.

In addition, in cases where switching to these alternatives is not possible, the use of recycled or reclaimed SF6 gas is promoted.

b) Policy mechanisms

- **Tax on fluorinated greenhouse gases** (Law 16/2013 of 29 October 2011 laying down certain measures relating to environmental taxation and adopting other fiscal and financial measures).
- **Gradual reduction of HFCs by quota system** in accordance with Regulation (EU) 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014.
- **Royal Decree 115/2017 of 17 February 2015 regulating the placing on the market and handling of fluorinated gases** and equipment based thereon, as well as the certification of professionals using those gases and establishing the technical requirements for installations carrying out activities that emit F-gases.
- **Voluntary agreement** for a comprehensive management of the use of SF6 in the most environmentally friendly electricity industry.
- Royal Decree 552/2019 of 27 September 2015 approving the Regulation on security for refrigeration installations and its additional technical instructions.

c) Responsible

MITECO and MINTUR.

3.1.4 Land Use, Land Use Change and Forestry (Regulation 2018/841)

The amendment of Regulation 2018/841, through Regulation 2023/839, providesfor a fundamental reform of the land use, land use change and forestry (LULUCF) sector and its accounting towards targets 2030. The main novelty introduced by the amendment is the establishment of a new target to maintain the current level of sinks in the EU (-268 MtCO2eq) and its increase by approximately15 % (-

42 Mt CO2eq), to achieve total removals in the EU of -310 MtCO2eq in 2030.

To this end, new binding national targets are set from 2026, at which point the coin accounting will citewith the LULUCF report in the national GHG inventory, and therefore the previously established accounting rules and the 'non-debit rule', which should ensure that emissionsdo not expose removals, calculated as the sum of total emissions and total removals on their territory in the accounting categories covered by Regulation 2018/841 for the period 2021-2025, will no longer apply.

The new framework therefore establishes two sub-periods, 2021-2025 and 2026-2030, with hetero-genic objectives andstandards. In the first subperiod, the original accounting and target rules of Regulation (EC) No 2018/841 are maintained, while in the second subperiod a target of -43,6 MtCO2eq is set for Spain, for which accounting will be made in accordance with the GHG inventory.

In this context, forecasts for the LULUCF sector in Spain continue to point to saturation of the capacity to sortCO2 by natural sinks, attributable to a number of different causes, including climate changecompacts in the Spanish agroforestry sector (increase in temperature and reduced water availability, especially) and in its CO2 absorption capacity, or the widespread increase in the risk of desertification across the territory.

The proposed measures on forest and agricultural sinks seek to reverse this trend, although due to the very nature of natural sinks and Mediterranean climate conditions, these measures require time to improve the removals generated, while contributing to the maintenance of the social, ecological and nomiceco functions of terrestrial ecosystems. It is therefore important to consider the long-term effect of these measures, especiallyin the context of climate neutrality proposed by Spain for 2050.

The study of various factors (land availability, biomass growth curves, planned policies and measures, etc.) in the original NECP supported the calculation of additional removals in 2030, estimated at 0,96 MtCO2eq relative to the baseline scenario (0,78 MtCO2eq in forest sinks and 0,18 MtCO2eq in agricultural sinks), although, as noted and for reasons of biomass growth dynamics and other carbon reservoirs, the effect of these measures was more effective after the deadline considered.

However, these efforts would not be sufficient to meet the new targets set for the period 20262030, which should lead to an additional increase of at least -5,3 MtCO2eq in 2030 compared to the levels achieved in 2020. It is therefore necessary to explore new ways of improving natural sinks, posing a huge challenge to the LULUCF sector and therefore to Spanish forestry, agricultural and livestock policy.

The work lines undertaken to align the LULUCF sector with the objectives set out in Regulation (EC) No 2018/841, as amended, are based on the increase in the area to be applied in sub-measures 1.35 and 1.36, on the development of new or plannedplanning elements, including the Nature Restoration Plan (whichgoes beyond Regulation (EU) 2024/1991 of the European Parliament and of theCouncil of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869), the new Spanish forestry policy framework (including the Horizon 2050 Spanish Forest Strategy and the Spanish Forest Plan 2022-2032) or the National Strategy to combat Desertification. These lines require a detailed study of their potential contribution to mitigation, as well as the feasibility for their implementation and availability of land, both in physical and legal terms. It is important to mention also the high uncertainty inherent in the LULUCF sector and its results.

As a result of the measures included in this Plan, compliance with the 'non-debit rule' established in the period 2021-2025, which maintains accounting rules in the original Regulation 2018/841, is expected to be complied with, with a surplus ofapprox. -10,2 MtCO2eq, as can be seen from the table below.

Table 3.2. Projection of LULUCF accounting under Regulation (EU) 2018/841 of$_{cumulative\ CO2}$eq emissions/removals over the period 2021-2025

LULUCF Regulation	WAM estimate 2021-2025 ($ktCO_2eq$)	Accounting principle 2021-2025	Accounts 2021-2025 ($ktCO_2eq$)

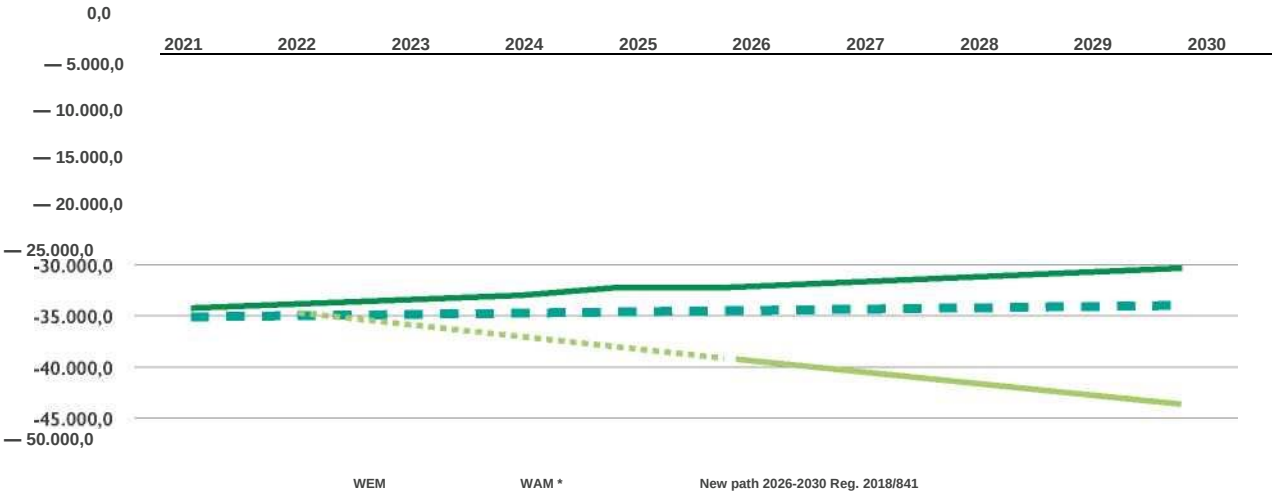
Deforested land	2.432	KP2 *gross-net*	2.432
Afforested land	— 17.189	KP2 *gross-net*	— 17.189
Managed forest land	— 150.806	FRL (-164.165 $ktCO_2eq$)	13.359
Farmland managed	— 8.796	*Net-net* average 2005-2009 (7.755 $ktCO_2eq$)	— 16.551
Managed grassland	1.238	*Net* average 2005-2009 (-6.515 $ktCO_2eq$)	7.753
Managed wetland	NA	*Net-net* average 2005-2009 (270 $ktCO_2eq$)	NA
		TOTAL	**— 10.195**

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

For its part, and in application of Regulation 2018/841 as amended, for the period 2026-2030 a trajectory will be established in 2024 with the starting point being the average of the results in the LULUCF chapter of the inventories for 2021, 2022 and 2023, for the year 2022, and the end point of the aforementioned target of -43,6 $MtCO_2eq$ in 2030. This trajectory will generate a carbon budget (defined by the sum of the results established by that trajectory in each of the 5 years from 2026 to 2030), the non-exceedance of which is another objective set by the amendment of Regulation 2018/841. On the basis of the data currently available, the deficit in this cumulated budget would be approximately 30 $MtCO_2eq$ for the whole period 2026-2030, in the absence of additional measures.

In this context, Regulation 2018/841 introduces a set of flexibilities that act as a safeguard against the circumstances specific to the nature of natural sinks. Of particular importance for Spain is the flexibility that provides for the long-term impacts of climate change, causing excess emissions or a decrease in sinks. In this regard, Spain considers that it will be able to achieve the objectives set out in this Regulation by making use of this set of flexibilities.

Figure 3.2. Projection of LULUCF accounting under Regulation (EU) 2018/841 of cumulative CO2eq emissions/removals over the period 2026-2030



** The 'WEM' and 'WAM' shown in the graph have been drawn up on the basis of the data from the 2021 edition of the GHG emission projectionsused by the Spanish inventory system. Note that the WAM path becomes WEM in the latest published projections (edition 2023).*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Finally, it should be noted that the amendment of Regulation 2018/841 and Regulation (EU) 2018/1999 obliges Member States to improve the methodologies used to estimate the balance between emissions and removals in all carbon reservoirs and LULUCF sector categories. Spain has started work on this in order to fulfil this commitment. This work will last for the coming years. To date, Spain has complied with one of the reporting requirements: report land use conversion through geographically explicit information,in accordance with the 2006 IPCC Guidelines for National GHG Inventories, thanks to the development of the LULUCF mapping series.

Fortotal greenhouse gas emissions, removals from activities inthe Land Use, Land Use Changes and Selviculture (LULUCF) sector were estimated for the year 2022 at -47.417 ktCO_2eq. These removals, which account for 16.1 % of total national gross emissions, accounted for -0.2 % of those estimated for 2021.

In addition, the Spanish inventory system is actively working on improving the methodologies to meet the requirements of Part 3 of Annex V to Regulation (EU) 2018/1999. The main work is currently focused on:

1. Assess the possibility of achieving Level 2 in SOC (SOC) reporting for each land use
2. Incorporate the calculation of carbon stock change (CSC) in deadwood depot in the category of forest land remaining as such
3. Explore options for reporting on the CSC of living biomass in the grassland category, using carbon mapping and stocks for each of the LULUCF sub-categories

MEASURE 1.35. FOREST SINKS

a) Description

The actions identified for forest sinks are described below.

A.1. Regeneration of dehesade systems

The main problem at present in the conservation of the dehesas is the absence of regeneration of the dominant woodland. This is due to various causes such as overgrazing, a lack of planning for silvopastoral management, excessive use of woods, excessive hunting load, forest fires or the incidence, in themost recent years, of radical rot and other factors that cause decay that colloquially fall under the dry designation. These factors have led to unfavourable conservation status in Spanish dehesas and other dehesate

systems, with inadequate tree densities.

This measure aims to regenerate the dehesas and other open woodland so that they are considered silvopastoral systems and fully count the sink effect, with the dual purpose of perpetuating these ecosystems, one of Spain's main social, economic and environmental assets, and avoiding costs and losses of CO_2, both in tree biomass and in the soil. Action is expected on 28.000 ha/year.

A.2. Promotion of ponds and native species to replace agricultural crops in flood areas

The aim of this measure is, at times, to encourage the streamlined cultivation of pots, taking into account theirimportance for the national economy and their environmental contribution in terms of absorption of CO_2, together with theirtrend share for the stabilisation of banks and compatibility with regular flooding and shedding, which could reach 3.000 ha/year. The latter makes it an appropriate crop for flood areas. It also acts as a natural filter of run-off water and surplus irrigation with fertilisers and plant protection products, as it is in transition land between agricultural land and river banks.

At the same time, this measure aims to boost the effect of forest sink through thepre-ferent development of native and structurally complex formations and species, avoiding as far as possible the orientation towards monocultures. In addition, in the context of the restoration of riverside vegetation andthe temptation of watercourses to create forest sinks, the objective of the Water Framework Directive will be respected in relation to the maintenance and achievement of good status of water bodies, hydromorphological indicators and riverbank vegetation. In other words, the restoration of native riparian ecosystems will be sought wherever possible.

For this measure, structurally complex native species (and sometimes new ponds) will be introduced in flooding areas with a return period of 10 years, according to the flood risk map of river origin to economic activity (SNCZI).

A.3. Creation of forested wooded areas

Forests play a central role in the global carbon cycle, capturing it from the atmosphere a medithat grow and store it in their tissues. Due to their huge biomass, forests are one of the largest carbon sinks. They also generate goods and products of great importance for society (biodi-versity, protection of the hydrological cycle, employment, products, etc.).

Under this measure, the promotion of afforestation activities (conversion, by human activity directa, of land without forest for a period of at least 50 years into forest land by plan, sowing or anthropic promotion of natural regeneration) and reforestation (conversion by direct human activity of non-wooded land to woodland through planting, seeding or anthropic promotion of natural regeneration, on land that was afforested but currently deforested) with an estimated potential of 16.000 ha/year are considered.

A.4. Execution of forestry work to prevent forest fires

We are currently facing a forest environment that is highly prone to fires, in which the means ofpre-staining are reaching effectiveness ceilings. It is therefore essential to increase the focuson preventive work to help reduce risks and facilitate extinction tasks.

This measure considers the work needed to reduce and control forest fuels, making woodland more resistant to the start and spread of fire and facilitating extinction in the event of a fire. Fuel control is achieved by breaking the spatial continuity of vegetation, by clearing, pruning, thinning, etc., especially in areas where mechanisation is difficult.

There are several hazards posed by forest fires, in addition to the carbon loss fixed in biomass and the generation of additional gas emissions (CH_4, N_2O, NO_x and CO) due to incomplete combustion, such as loss of soil organic carbon and consequent erosion, or public expenditure to act on extinction.

The working method is based on the application of techniques by specialised staff, proposing and applyingspecific and balanced measures to monitor and improve vegetation, taking into account the reconciliation of the interests of the various groups present in the territory.

A.5. Controlled grazing in strategic areas for forest fire prevention

This measure also focuses on forest fire prevention, but proposing the integration ofplanned grazing activities into fire prevention, as a further complementary tool.

Controlled grazing in pasture-fire areas is a sustainable agricultural practice, in which livestock helps to reduce fire risks and plays an important ecological role in Mediterranean woodland. In addition, their inclusion in the mountain management toolkit stimulates surveillance and the interest of the local population in preserving it, encouraging coordinated work between technicians and livestock farmers, which strengthens social fire prevention.

Grazing in firebreaks is therefore a useful tool in fire prevention, while offering very positive environmental and social externalities, which ultimately makes it a smooth managementsystem for the territory.

A.6. Promotion of sustainable forest management in conifers, implementation of a clear regime to increase carbon absorbed

In addition to the increase of forest area through planting and land use changes, it is possible to increase the biomass accumulation capacity of the forest systems already established by implementing different management proposals.

The clear ones, understood as reducing the density of individuals of the same species, are silver intervention asthe fundamental intermediate in the management of forest systems. Its objectives include reducing competition, improving individual tree vigour, regulating the specific composition, anticipating and maximising output at the end of the shift, and increasing the value and size of products.

From the point of view of setting CO_2, there is ample scientific evidence that, although the clear result is a reduction in the woodland in the forest, the application of certain schemes may increase the total of CO_2 absorbed by the forest throughout the production cycle.

This measure encourages the establishment of management plans to ensure the implementation of a clear plan that is appropriate, quantifying the improvement it would bring in terms of absorption of CO_2, without quantifying other benefits associated withtwo (improvement in forest health, reduction of forest fires, etc.). Action is estimated at 200.000 ha/year.

A.7. Hydrological and forest restoration in areas at high risk of erosion

Hydrological and forest restoration comprises all the actions needed to preserve, defend and restore soil stability and fertility, regulate run-off, consolidate watercourses and slopes, contain sediments and, in general, protect the soil against erosion, actions that manage to retain organic carbon from soils as well as other synergistic effects such as protection against desertification, droughts and floods, conservation and restoration of biodiversity and enrichment of the landscape.

The measure consists of the establishment of structures aimed at the correction and stabilisation of watercourses in areas at high risk of erosion (according to the desertification risk map of the National Action Plan against Desertification), without considering the afforestation of such land as these actions are considered to be a separate measure.

b) Policy mechanisms

- Possible interventions to be developed under the CAP Strategic Plan in Spain.
- Inclusion, where appropriate, of some interventions in third generation river basin management plans and flood risk management plans.
- Harmonisation of charges for the use of public water resources in order to encourage the planting of winches in authorised areas.
- Promotion of public-private financing instruments aimed at promoting the creation of territorial contracts and payment systems for environmental services that develop forest fire prevention measures.

- Analysis and study of forest taxation to promote active forest management and thus reduce the risk of forest fires.
- Promotion of public-private financing instruments aimed at promoting the creation of territorial contracts and payment systems for environmental services that develop measures to facilitate grazing on forest land.
- Impetus through MITECO initiatives such as:
  - Carbon Fund for a Sustainable Economy (FES-CO2). Including carbon sinks in its scopeof action
  - Recording of carbon footprint, compensation and carbon dioxide removal projects. Working on the extension of project typologies to be registered, and improving and clarifying other aspects of the project. Similarly, working to link it to the European framework for certification of removals
- Promotion of intermediate forestry treatments to improve the production of higher added value forest products and energy recovery of forest residues
- Development and implementation of the Forest Water Restoration Priority Action Plan
- Development and implementation of the Spanish Forestry Plan 2022-2032.
- Development and implementation of the National Strategy to Combat Desertification
- Development and implementation of the PRTR, Component 4 “Conservation and restoration of marine and terrestrial ecosystems and their biodiversity”
- Development and implementation of the State Strategic Plan for Natural Heritage and Biodiversity
- Boosting responsible public procurement that boosts local consumption of forest products

(C) Responsible

Map and MITECO, together with the Autonomous Communities, in accordance with Spain’s distribution of competences.

MEASURE 1.36. AGRICULTURAL SINKS

a) Description

The actions identified for agricultural sinks, which together form an additional measure for the WAM scenario or Objective Scenario of the PNIEC 2021-2030, are described below. They are also relevant for the synergies they present for better adaptation of the agricultural sector to the impacts of climate change and are therefore aligned with the NAPCP.

A.1. Promotion of conservation agriculture (direct sowing)

This measure consists of the application of conservation farming techniques, leading to an increase in CO_2 removals by agricultural soils and a reduction in emissions from the use of oilga by agricultural machinery. The measure is appropriate both in terms of mitigation and adaptation to climate change, as it encourages soil to act as a carbon sink and also improves its resilience. Implementation requires training for farmers.

A.2. Maintenance of plant cover and incorporation of pruning remains in the soil in woody crops

This measure provides for the maintenance of plant cover between the streets of the crop or the incorporation ofpruning res of woody crops into the soil. These two agronomic practices are compatible and synergistic.

The reduction of greenhouse gases is achieved, on the one hand, by disregarding traditional soil tillage and, on the other hand, by preventing the uncontrolled burning of pruning remains. In addition to reducing emissions, agronomic(by improving soil structure and productivity), environmental (by increasing soil organic carbon, associated biodiversity and protecting the soil from erosion) and economic (avoiding some of the necessary fertilisation) are produced.

b) Policy mechanisms

► MAPA regulatory measures or interventions in the CAP Strategic Plan.

► PRTR, Component 3, Investment 4, C3.I4: 'Plan to promote the sustainability and competitiveness of agriculture and livestock farming (III): Investments in precision agriculture, energy efficiency and circular economy in the agriculture and livestock sector'.

► Impetus through MITECO initiatives such as:

  ► Carbon Fund for a Sustainable Economy (FES-CO2). Including carbon sinks in its scopeof action.

  ► Recording of carbon footprint, compensation and carbon dioxide removal projects. Working on the extension of project typologies to be registered, and improving and clarifying other aspects of the project. They also work on linking them to the European framework for the certification of removals.

c) Responsible

Map jointly with the Autonomous Communities, in accordance with Spain's distribution of competences.

Among the policy mechanisms identified in both Measure 1.35 and Measure 1.36, the use of instruments for mobilising both public and private finance should be highlighted. In particular, the Common Agricultural Policy Strategic Plan (CAP Strategic Plan) provides a boost to carbon sequestration by Spanish agricultural areas, as farmers receive a financial contribution in return for the incorporation of certain agricultural practices beneficial for carbon sequestration. The mitigating effects of the CAP Strategic Plan are included under measure 6.7 of this NECP, which covers eco-schemes and agri-environmental commitments that have an impact on reducingGHG and other polluting gases and increasing removals. A conti nulland void, these measures are listed:

- Carbon farming and agroecology: Extensive grazing, mowing and biodiversity in Pastos areas
- Carbon farming and agroecology: Rotations and direct sowing on arable land
- Carbon farming: Inert green roofs and roofs in woody crops
- Agri-environmental commitments in agricultural areas. Commitments to promote and sustainably manage pastures.
- Agri-environmental commitments in agricultural areas. Practices for soil improvement and combating erosion
- Agri-environmental management commitments in organic farming
- Support for non-productive investments on agricultural holdings linked to mitigation – adaptation to climate change, efficient use of natural resources and biodiversity
- Support for productive investments on agricultural holdings linked to contributing to climate change mitigation – adaptation, efficient use of natural resources and animal welfare
- Aid for investments with environmental objectives in the processing, marketing or development of agro-food products, for

investments in improving energy efficiency primarily for environmental purposes, in theproliferation of waste and materials from livestock farming to increase energy self-sufficiency and for the uptake of renewable energy sources in industry

- Aid for investments in irrigation infrastructure with environmental objectives, promoting the use of renewable energy sources and improving the energy efficiency of installations

The CAP Strategic Plan provides for annual monitoring and review of measures where necessary. The CAP Strategic Plan also providesfor my impact on carbon sinks, both under Pillar 1 (eco-schemes) and under Pillar 2. Under Pillar 2, under the EAFRD, afforestation of agricultural land or organic farming continues to be programmed, which has a positive effect as carbon sinks.

Furthermore, private participation in promoting increased removals, both agricultural and forestry, is centralised in Spain through the Carbon Footprint Register, compensation and carbon dioxide removal projects. This voluntary initiative was launched in 2014 and generates a portfolio of forest projects with which Spanish organisations can offset their carbon footprint. Projects must have a management plan and cover a number of monitoring and monitoring obligations.

3.1.5 Taxation

MEASURE 1.37. TAXATION

(a) Description

In line with the Agenda for Change adopted by the Council of Ministers on 8 February 2019, which calls for theneed to 'adapt the tax system to the 21st century economy', as well as for a 'new green taxation – alignment of taxation with environmental impact', the Ministry of Finance will lead the in-depth study and, where appropriate, the corresponding rollout of the updatingof those elements of the tax system that systematically include a low-carbon and climate-resilient economy, through the progressive and widespread internalisation of the environmental externalities that occur in energy generation and use, as well as in the performance of those main economic activities that generate greenhouse gas emissions and increase the vulnerability of the Spanish economy.

This cannot be separated from the Fit for 55 package, and in particular from the Commission's July 2021 proposal for the recast of the Energy Taxation Directive (ETD),which aims to amend the objective of taxation of energy products and electricity in the EU and to promote the green transition for all.

In addition, the Climate Change and Energy Transition Act has set out a number of measures in the field of green taxation that will support the contribution of the ambitious climate targets set out in thisIntegrated National Energy and Climate Plan. Specifically, the Law provides as follows:

- The application of new tax advantages to **fossil-based energy products should**, in general, be **duly justified** on grounds of social or economic interest or in the absence of technological alternatives.

  The Ministry of Finance shall draw up an annual report on the tax regime applicable tofossil-based gene products and, on that basis, MITECO will draw up a proposal for a timetable for reviewing the aid and measures promoting the use of this type of energy products.

- As regards public resources for combating climate change:

  - At least a percentage equivalent to that agreed in the European Union's Multiannual Financial Framework of the General State Budget shall contribute to the climate change objectives and the energy transition.

  - Revenues from the auctioning of greenhouse gas emission allowances will be usedto finance the costs of the electricity system provided for in the Electricity Law, which relate to the promotion of renewable energy; mitigating situations caused

by the transition to a decarbonised economy or related to vulnerability to climate change impacts; and compensation of the effects of indirect costs for CO2 emissions, linked to the consumption of electricity, for installations at risk of carbon leakage.

- It amends Law 15/2012, of 27 December, on fiscal measures for energy sustainability, so that in each year the General State Budget Laws will allocate an amount to finance the costsof the electricity system provided for in the Electricity Sector Law, relating to the promotion ofrenewable energy.

The proposal for the Law on climate change and energy transition to create a group of experts tobring about a tax reform that will value green taxation has been implemented by the White Paper onRe-form of Taxation, published on 4 March 2022, which devotes a specific section to biental midamtaxation. In any case, as regards the decision and timetable for the implementation of the necessary reforms at any given point in time, the starting macroeconomic situation and the future prospects of the economy, the consolidation of the recovery, the principle of gradualism in the design and implementation of the various measures, and the attention to the European and international regulatory context are prerequisites.

Thus, for example, Royal Decree-Law 5/2023 of 28 June has authorised tax deductions from personal income tax to promote the purchase of electric vehicles by private individuals and the installation of charging points. In the area of corporate tax, in order to encourage the electronisationof mobility, a tax incentive is introduced to promote the charging facilities, both for private use and publicly accessible, of new electric vehicles with normal power or high power, as defined in Article 2 of Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure, allowing for their accelerated depreciation provided that they become operational in the financial years 2023, 2024 and 2025.

Similarly, Royal Decree-Law 4/2024 of 26 June 2011 extending certain measures to address the economic and socialconsequences of the conflicts in Ukraine and the Middle East and adopting urgent measures in the field of tax, energy and social matters, in the area of corporate tax, and in order to further promote the electrification of mobility, reinforces the tax incentive aimed at promoting Inversio nesin new vehicles or new charging facilities. both for private use and those accessible to the public, of electric vehicles, as mentioned above, replacing the current accelerated depreciation rate, with the assistance of applying the double maximum linear depreciation coefficientin accordance with officially approved tables, with a free depreciation, provided that these are new investments entering into operation in the tax periods starting in 2024 and 2025.

3.2 Dimension energy efficiency

3.2.1. Measures to comply with the energy savings obligation. Sectoral approach

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency laysdown in Article 7 the obligation to provide evidence of cumulative final energy savings per period.

In compliance with this obligation, in the original version of the NECP Spain communicated to the European Commission a cumulative savings target of 36.809 ktoe for the period 2021-2030, although this value was updated to 37.206 ktoe, as it was necessary to take into account the latest values published by Eurostat for annual final energy consumption in Spain for 2016, 2017 and 2018, which averaged 84.560 ktoe. Thus, the annual savings target for each of the years 2021-2 030 was initially 676 ktoe. This figure is significantly higher than the cumulativeAho rro target for the previous period, i.e. between the years 2014-2020, and which amounted to 15.979 ktoe.

However, this target has fallen behind with the entry into force of Directive (EU) 2023/1791 of the EuropeanParliament and of the Council of 13 September 2023 on energy efficiency (hereinafter EED). Thus, in this Plan, a new **cumulative target value for final energy savings of 1.49 % on average hasbeen established, corresponding to a cumulative target of 53.593 ktoe**, based on a staggered increase in the intensity of the target, accordingto the EED precepts:

- 0.8 % by 2021-2023, resulting in an annual savings target of 676 ktoe;
- 1.3 % for 2024-2025, with an increase of the target to 1.099 ktoe per year;
- 1.5 % for 2026-2027, representing an annual savings target of 1.268 ktoe;
- 1.9 % for 2028-2030, representing an annual savings target of 1.607 ktoe.

Thus, 53.593 ktoe would be the value of the cumulative final energy savings target in the case where the calculation base reduction mechanisms and the flexibilities allowed under Article 8 (6), (7) and (8) EED are not applied.

In this respect, it should be noted that Spain will benefit from and apply all the flexibilities allowed by the EED (Article 8 (6), (7) and (8)), whenever possible, i.e. provided that it achieves the savings target of the years 2021, 2022 and 2023 (676 ktoe/year or a cumulative 2030 of 18.252 ktoe). In such a case, and in accordance with the provisions of the Directive, flexibilities will only apply to the first three years of the obligation period. Despite this twin trictionin the implementation years, the result can have a considerable impact, as they are the years with the highest multiplier effect and thus the years that contribute most to the cumulative value of the target.

In no case, in accordance with Article 8 (9), the flexibilities applied may together lead to a reduction of more than 35 % of the amount of energy savings calculated in accordance with paragraphs 6 and 7.

The cumulative savings targets will be achieved by means of a set of complementary measures, including those promoted by the Recovery, Transformation and Resilience Plan, the National EnergyEfficiency Obligations System, in which electricity and natural gas trading companies and wholesale operators of petroleum products and liquefied petroleum gases have the status of obliged parties; as well as through the application of alternative regulatory, fiscal, economic or information and communication measures.

The energy efficiency obligation scheme is regulated in Spain by Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency. This Law also created the National Energy Efficiency Fund (73 **NEEF**), without legal personality, as an instrument for the implementationof nasm financial and economic support, technical assistance, training and information or other

73| IDAE Energy Efficiency National Fund

measures aimedat fostering energy efficiency in all sectors. Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery **extended the period of validity of the National Energy Efficiency Obligations System (SNOEE) until 31 December 2030,** in accordance with the provisions of Directive (EU) 2018/2002.

In addition, Royal Decree 36/2023 of 24 January 2015 establishing a **system of Aho rro Energía Certificatescreates** a new tool to achieve the energy saving targets committed to the EU in a flexible and effective way. This system enables the creation of a new market that will make it easier for obligated parties to meet their savings obligations, benefit consumers and boost employment, productivity and business competitiveness. It also complies with one of the measures provided for in the Plan More Energy Security. The tool will allow companies subject to an annual share of energy savings to voluntarilyreplace a percentage of their payments to the EENF with certified energy savings from energy efficiency investments. This system is described in detail in Measure 2.23.

In addition to the mechanisms that can beset up within the SNOEE with the resources of the EENF and with the current system of energy saving certificates, this Plan considers alternative measures, such as **strategic, regulatory, aid and tax** methods to enable the largest and fastest market penetration of energy-efficient technologies**.** In addition, the cross-cutting nature of energy efficiency has a synergistic effect with many of the measures included in the decarbonisation dimension, as well as on the other dimensions. This also responds to the application of the energy efficiency first principle, which serves as a compelto the measures of the entire NECP.

Alternative measures include the investments set out in the Indicative Strategy for the Development of Rail Infrastructureand the Goods 30 initiative of[74] the Ministry[75] of Transport andSustainable Movi, which will promote the improvement of the energy efficiency of the conventional rail system, making it more efficient and competitive and enabling it to better meet the needs of daily metropolitan mobility and freight. In parallel, energy efficiency measures in air and maritime transport will be promoted. For its part, the Secure, Sustainable and Connected Mobility Strategy 2030 (EMSSC 2030)[76], adopted in December 2021, aims to transform the sector around three main axes: the massive introduction of technology into mobility, the need for decarbonisation of the economy and the importance of connectivity in view of the unequal concentration of the population in the territory. EMSSC 2030 will be the document guiding the Ministry's actions in the field of transport and mobility until 2030, replacing the PITVI (which expires in 2024). In the field of mobility, mention should also be made of Law 7/2021, of 20 May, on Climate Changeand Energy Transition, which stipulates that, in implementation of the decarbonisation strategy to 2050, the necessary measures shall be adopted, in accordance with European Union legislation, to ensure that new passenger cars and light commercial vehicles, excluding those registered as historical vehicles, not intended for commercial use, gradually reduce their emissions so that they are vehicles with emissions of 0 g CO_2per km by 2 040 in accordance with Community legislation.

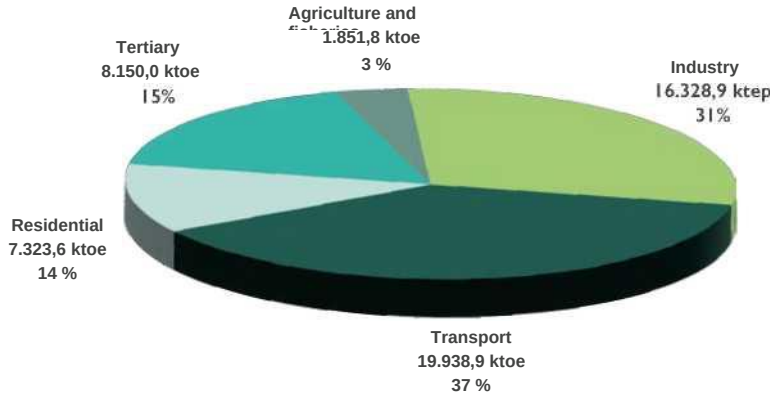
The tax measures include Law 7/2021 of 20 May 2003 on climate change and energy transition, which establishesa number of measures, including limiting the application of new tax benefits to fossil-based energy products, including the inclusion of an additional allocation in the General State Budget to contribute to the objectives set for climate change energy transition, the promotion of green taxation, and the amendment of Law 15/2012 of 27 December 2011 on fiscal measures for energy sustainability.

This Plan, in the Energy Efficiency Dimension, presents 23 measures with the aim of meeting the cumulative savings target value resulting from the EED, prior to the application of the flexibilities provided for in Article 8 of the EED.

For the current obligation period 2021-2030, the Ministry for the Ecological Transition and the Demographic Challenge has provideda forecast in which the transport sector is expected to contribute most to the cumulative final energy savings target for the period 2021-2030, allocating it a savings target of 19.938,9 ktoe, representing 37 % of the cumulative energy savings target in the period. It is followed by the industrial sector, with a cumulative saving target of 16.328,9 ktoe for the period, which represents 30 % of the target. The tertiary sector then has a saving target of 8.150,0 ktoe, which represents 15 % of total savings. The residential sector has a saving target of 7.323,6 ktoe, accounting for 14 % of the total. The agriculture and fisheries sector has the lowestcontribution with 1.851,8 ktoe (3 %) of cumulative savings. The graphic representation of this distribution is shown in the figure below.

74Railway Indicative Strategy
75Goods 30
76EMSSC 2030

Figure 3.3. Cumulative final energy saving by Sector in Spain 2021-2030 (ktoe)[77]



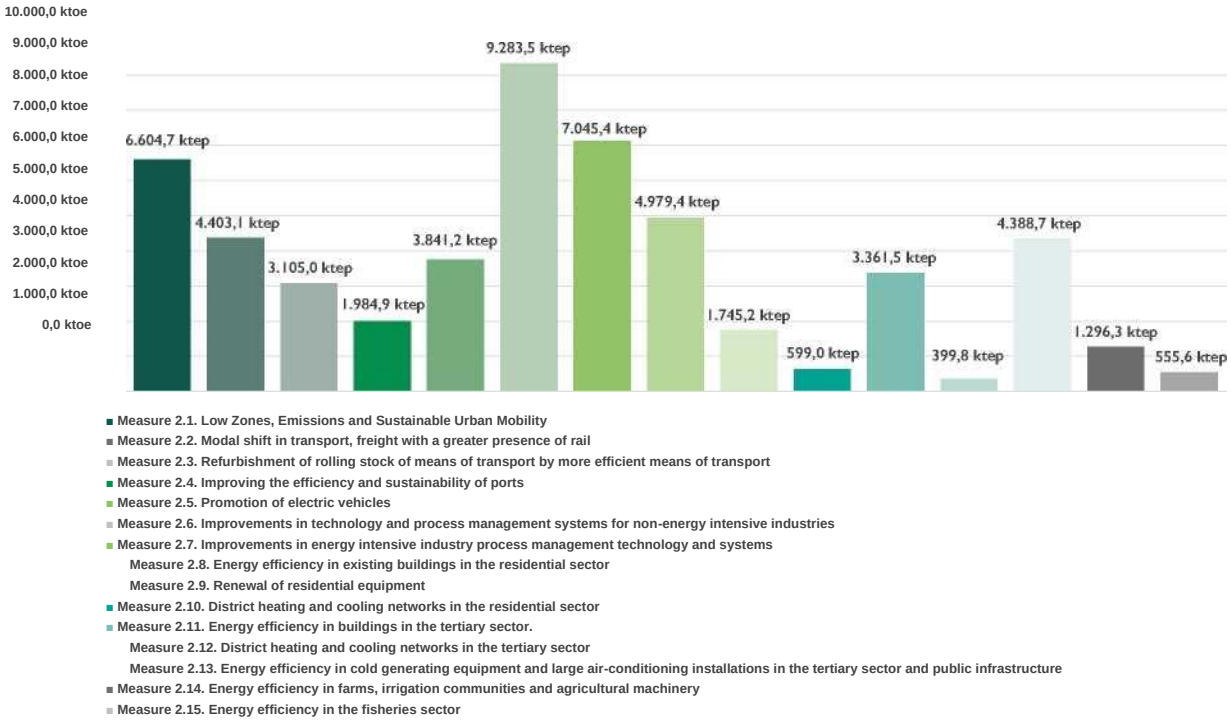
Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Thus, the total cumulative volume of final energy savings for the period 2021-2030 achieved by the eleven sectoral measures would amount to 53.593,1 ktoe. Further details can be found in Annex F.

77 The quantification of the savings included in this chapter includes those necessary to ensure compliance with the cumulative final energy savings target of the Energy Efficiency Directive, formulated in terms of cumulative final energy savings from 1 January 2021 to 31 December 2030.

The following figure shows the savings for each of the 15 sectoral measures included in this plan:

Figure 3.4. Cumulative final energy savings by measures in Spain 2021-2030 (ktoe)



Source:
Ministry of
Ecological Transition and the Demographic Challenge, 2024

The 15 measures included in the graph above are subdivided into instruments. Many of them will be amended as a result of the transposition of the new Energy Efficiency Directive, the Energy Efficiency Directive in Buildings or the Renewable Energy Directive.

Other instruments to be implemented in the period 2021-2030 include the reforms and investments set out in the Recovery, Transformation and Resilience Plan, the green tax reform, the provisions laid down in Law 7/2021 of 20 May on climate change and energy transition, the draft Law on Sustainable Mobility, the Safe, Sustainable and Connected Mobility Strategy 2030, Royal Decree 1052/2022 regulating low-emission zones, the new municipal regulations to restrict access. traffic and parking for the most emitting and polluting vehiclesin municipalities with more than 50.000 inhabitants, island territories and municipalities with more than 20.000 inhabitants, which raise the emission limitvalues for certain pollutants and encourage the renewal of distribution fleets, among others.

In addition, these sectoral measures are complemented by the horizontal and financial measures defined in this section.

Transport sector

MEASURE 2.1. LOW-EMISSION ZONES AND SUSTAINABLE URBAN MOBILITY

a) Description

The objective of this measure is to encourage a modal shift towards more sustainable means of transport, prioritising active mobility and public transport, as stated in Article 5 (*1*) of Royal Decree 1052/2022, by addressingthose that must include a low-emission

zone project, reducing final energy consumption, carbon dioxide emissions and improving air quality by acting on urban and metropolitan mobility through significant changes in modal split. with a greater involvement of the most efficient modes, to reduce the use oflow-occupancy private vehicles, encouraging the use of collective public transport and energy non-consumer modes, such as walking and cycling, as well*as* carpooling and carsharing, with a particular focus on local transport, which reduce dependence on private transport and support economically vulnerable citizens who cannot access the purchase ofcars. In that regard, actions to reduce emissions and improve air quality, in addition to making the use of older and more polluting vehicles more difficult, should also consider and mitigate their impact on vulnerable people – with lower incomes – who cannot afford spending to purchase less polluting vehicles. Similarly, it is also important to consider interurban mobility, since, forexample, interurban mobility by bus is particularly relevant for low-income people and residents in areas with low population density.

It is also important to stress the importance of having urban design appropriate to sustainable mobility parameters in order to promote energy efficiency and less polluting and emitting modes. It is particularly relevant when new developments are undertaken so that the sustainable mobility variableis incorporated from the very beginning of the urban design modification.

The measure aims to reduce the use of private vehicles, especially those with combustion engines, which this NECP considers feasible to reduce traffic in urban environments by 41.3 % by 2030 and metropolitan traffic by about 1.5 % per year; teleworking, car-sharing, the use of non-motorised means and collective public transport will make it possible to meet these objectives, and it is of great importance to enable adequate funding for public transport in order to improve quality and service, attract more users and thus contribute to the improvement of air quality in urban environments.

In order to promote changes in transport demand, the opportunities offered by the digitalisation of information and communication technologies (ICT), applied to mobility management (fleet management, car parks, traffic restrictions, autonomous vehicles, etc.), as well as mobility as a service *('Mobility as a Service')* and payment for use or payment per service, as opposed to payment for property, must be fully exploited, a concept increasingly rooted in the new generations.

One of the drivers of change is the establishment of low-emission zones, in accordance with Law 7/2021 of 20 May and Royal Decree 1052/2022 of 27 December regulating low-emission zones, in all cities with more than 50.000 inhabitants of the national territory, in island territories and in municipalities with more than 20.000 inhabitants in which the limit values for regulated pollutantsin Royal Decree 102/2011 of 28 January on improving air quality are exceeded, i.e. the delimitation of areas with access, circulation and parking limited to the most emitting and polluting vehicles. The purposeof this Real De Creto is to contribute to improving air quality and mitigating climate change, resulting in better public health and urban quality of life, promoting more sustainable and inclusive mobility with less impact on the quality of the noise environment, encouraging active mobility and the restoration of public space, and promoting improved road safety and pacification of traffic. The measure covers a wide range of actions of different types to enable investments in infrastructure that wouldstifle the necessary modal shift. In developing the guidelines drawn up by MITECO to guide the design and implementation of low-emission zones by local authorities, the Spanish Federation of Municipalities and Provinces has been involved, as cooperation with local authorities is key.

In this regard, this measure is defined with a broad approach that goes beyond the scope of the actions that have been put in place since 2015 under the EEF. In this Plan, the involvement and coordination of all local andregional authorities, as well as the competition of private initiatives and, in particular, of financial institutions, are key to mobilising investment. In addition, encouraging coordination in the development of regional legislationon mobility, in accordance with the bases to be established at national level, will be one of the priorities.

It is also important to pay due attention to spatial planning plans and sectoral plans, as it is at this higher level of planning that provisions and criteria are adopted that then take the form of infrastructure and urban development projects in which mobility and transport modes have been highly conditioned. This is consistent with the Secure, Sustainable and Conec Mobility Strategy2030 (MITRAMS) and the Spanish Urban Agenda of the MIVAU.

Specifically, implementation will be promoted through public support programmes for the measures contained in the **Sustainable Urban Mobility Plans**, to be carried out by local authorities (with the support of other territorial administrations and, where appropriate, the General State Administration, in the terms and with the resources determined in this regard), and **of labour**

transport plans put in place by companies.

This measure is consistent with the priorities set out in Articles 102 and 103 on sustainable mobility of Law 2/2011 on the Sustainable Economy and Article 14 of the Law on Climate Change and Energy Transition.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The estimated savings of the measure are around 6.604,7 **ktoe of cumulative final energy savings during the 2021– 2030 pipeline**, out of a total of 19.938,9 ktoe representing the total transport sector.

c) Sectors addressed

This measure is addressed to municipalities, councils, councils and other local representative bodies abovemunicipal level, as well as publicly or privately owned workplaces and companies or businesses (such asrailway companies, industrial estates, educational or health centres, universities, leisure parks, shopping centres, etc.). Similarly, transport authorities and undertakings.

d) Eligible actions

Eligible actions will be those that achieve a reduction in CO_2 emissions and final energy consumption, through major changes in compliance with SUMPs (which will include the establishment of the BEZs) or expected changes for sustainable urban and metropolitan mobility:

- **Implementation and development of Sustainable Urban Mobility Plans (SUMPs)**: measures such as the generalisation by 2 023 in all cities with more than 50.000 inhabitants of Spain and island territories, as well as municipalities with more than 20.000 inhabitants when the limit values for pollutants regulated in Royal Decree 102/2011 of 28 January on improving air quality are exceeded, the delimitation of low-emission zones with access, circulation and parking restricted to the most emitting and polluting vehicles (a measure also included in Law 7/2021 of 20 May on Climate Change and Energy Transition and regulated by Royal Decree 1052/2022 of 27 December regulating low-emission zones).

  It will also promote the regulation of public land take with sustainable mobility criteria, the implementation of some of the recommended measures in the transport sector to improve air quality as set out in the short-term framework[78] action plan in the event of ambient air pollution events, promoting car sharing, regulating parking, promoting cycling, improving and promoting public transport, etc.

- **The implementation and development of Labour Transport Plans (PTT)**: with measures such as shared mobility services in enterprises, promotion of cycling, promotion of public transport, and other measures associated with demand-side management such as the deployment of teleworking, dynamic shift management, time flexibility, etc.

- **Economic diagrams**: financial support measures for collective public transport, in others through the introduction of the State Fund for the Contribution to Sustainable Mobility (FECMO-FCPJ), included in the draft Sustainable Mobility Act.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

- **Strategic documents**: The State Strategy for Bicycle was published on 8 June 2021, with a time horizon until 2025. A strategy that aims to boost cycling in all its areas, and therefore involves a large number of actors, both in the AAs. PP, such as from the business sector and civil society. The Bicycle Strategy is understood as one of the key actions under the Secure, Sustainable and Connected Mobility Strategy 2030, which is included under policy window 1, 'Mobility for all'.

- **Legislative measures**: Law 7/2021 of 20 May 2003 on Climate Change and Energy Transition. Through the future Sustainable

78 Short-term Framework Action Plan in the event of episodes of ambient air pollution by particulate matter below 10 µm (PM10), particulate matter below 2,5 µm (PM2,5) nitrogen dioxide (NO_2), ozone (O_3) and sulphur dioxide (SO_2)

Mobility Law, amendment of Article 103 of Law 2/2011 on the sustainable economy ('Preparation of transport plans in enterprises'), requiring its implementation for companies with more than 250 workers per shift (large companies) and setting up for these companies the role of mobility coordinator, in order to increase the number of companies that have a PTT.

Other legislative measures will be those that implement the corresponding laws of the Autonomous Communities on vilityin their respective areas of competence, as well as in municipal regulations and other municipal regulations with regard topopulations of more than 50.000 inhabitants relating to restrictions on private traffic, the management of clearance, car-sharing, traffic calming and reservation of public transport lanes and other measures aimed at sustainable mobility.

Specifically, in the area of low-emission zones, the measures to be taken are the establishmentof low-emission Zones, in accordance with the provisions of Royal Decree 1052/2022 of 27 December 2009 regulating low-emission zones, as well as the regulations and other municipal regulations establishing such low-emission zones.

The **Sustainable Mobility Law, which is one of** the reforms undertaken by Spain under the PRTR, is currently under way. This standard will comprehensively address society's needs in the face of new models and requirements related to mobility and regulate activities related to transport and mobility, including issues related to planning and financing of transport infrastructure and services, improved governance, alternative fuels, inclusive mobility, promotion of INNO vationand digitalisation, improvement of transparency and accountability.

Also relevant is Law 10/2021, on remote work, which regulates remote work, understood as work performed over a reference period of three months with a minimum of 30 % of the working day or the proportional part of the duration of the employment contract. In addition, Order PCM/466/2022 approves the plan of energy saving and efficiency measures of the AGE and the state institutional public sector entities, including measures ofsustainable vility and the strengthening of remote work.

Public aid programmes: programmes promoting the implementation of the measures and actions contained in the Sustainable Urban Mobility Plans, the Labour Transport Plans and the economic support schemes for collective public transport;

- **Low-emission zones**[79]. Under the PRTR, MITRAMS has already boosted EUR 1.500 million to improve air quality and reduce noise in cities, deploy fleets powered by zero-emission alternativefuels and promote cycling infrastructure and pedestrian routes for alternative and active mobility. The first call mobilising EUR 1.000 million has enabled projects to be promoted in 171 municipalities with more than 20.000 inhabitants, and two supra-municipal authorities, which in turn bring together 86 municipalities; plus a second call mobilising EUR 500 million to boost projects in 112 municipalities. Eligible actions include accelerating the deployment of pedestrian areas and routes in the centre of cities and boosting cycling and other personal means of transport with the construction of cycle lanes, road and urban space adaptation, safe parking and the deployment of bicycle rental services, measures to calm road traffic, build park-and-ride and establish unregulated parking areas outside low-emission zones.

- **DUS 5.000**[80]. The programme of investments in unique local clean energy projects in municipalities with a demographic challenge DUS 5.000 aims to contribute to the energy transition and the generation of activity in townsand cities with fewer than 5.000 inhabitants, through actions that constitute unique clean energy projects, including, inter alia, sustainable mobility actions, facilitating modal shift and ensuring the involvement of municipalities in the deployment of charging infrastructure and boosting the electric vehicle.

- **Grants/aids to improve and promote collective public transport**. Through theexisting or planned procedures of MITRAMS and other ministerial departments, including aid programmes for the autonomous communities and cities of Ceuta and Melillas, actions to: co-financing of the operational costs of public urban public transport; economic support fortransport services and/or mobility services that contribute to the achievement of objectives ofdesarbonisation, air quality, social

79 CallNo 2022: Support programme for municipalities for the deployment of low-emission zones and the sustainable and digital transformation of transport

80DUS 5000 PROGRAMME. AID FOR INVESTMENTS IN UNIQUE LOCAL CLEAN ENERGY PROJECTS IN DEMOGRAPHICALLY CHALLENGED MUNICIPALITIES

protection or protection for the territories affected by the demographic challenge, even if these are not provided in urban areas; strengthening and establishing new social tariffs/subscriptions – considering transport poverty and support for vulnerable users; **support for integrated pricing and the 'single ticket' to promote collective public passenger transport,** through the cooperation of the competent public administrations and transport service operators; etc.

- **Information**: development and updating of sustainable urban mobility guides and manuals; maintenance, on the MITECO and IDAE website, of a platform aimed at citizens and mobility managers, including these guides, as well as useful information to promote the implementation of Sustainable Urban Mobility Plans and Labour Transport Plans; support for the creation of Mobility Observatories in different policy areas, forums and working tables on sustainable mobility.
- **Communication**: specific communication and information campaigns to promote modal shift and rational use of private vehicles in urban travel; development and promotion of institutional campaigns to promote public transport and support new sustainable mobility, including awards and awards for exemplary projects.

f) Financial needs and public support

This investment is being co-financed with RRF funds through investment C1.I1 with EUR 1.500 million for local authorities to finance projects to establish low-emission zones, transform urban public transport fleets and collect waste towards zero-emission fleets, as well as all types of actions to promote sustainable urban mobility, including digitalisation projects. This is compounded by EUR 900 million forComu nidades standalone for similar projects within its remit.

In addition, MITRAMS (PRTR) will allocate more than EUR 1.620 million for Cercanías' infrastructure, including Cercanías'-infrastructure; more – to support collective public transport – the future allocations from the FECMO andother inputs and resources, such as those from the auctions of allowances, the future Social Climate Plan stemming from the Social Climate Fund, etc.

Similarly, the SNOEE will make it possible to invest the obligated parties, through the Early SavingCertificates System (CAE) described in Measure 2.23, as efficiently as possible in both replicable andunique actions, issuing and settling the corresponding certificates; for example, to promote energy efficiency through company mobility schemes.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO and MITRAMS (de ma nera-coordinated with other ministerial departments with cross-cutting competences in the field of transport), together with the Autonomous Communities and, in particular, local authorities.

MEASURE 2.2. MODAL SHIFT IN FREIGHT TRANSPORT WITH A HIGHER PRESENCE OF RAIL

a) Description

The aim is to reduce final energy consumption and carbon dioxide emissions by promoting actions that boost rail in freight transport by reducing road transport. Rail is one of the most energy efficient modes of transport per tonne transported, compared to road transport, rail can carry large volumes of goods with the lowest fuel consumption and gaseous pollutant emissions.

In this regard, axis 6.1 of the Secure, Sustainable and Connected Mobility Strategy 2030 approved by the Council of Ministers on 10 December 2021 provides for an effective increase in rail freight transport. In particular, a series of short- and medium-term impact measures and actions have been identified,with a view to increasing the modal share of rail freight to 10 %. The following should be highlighted:

- Identification of priority actions on the rail network for freight transport
- Creation of a catalogue of logistic and intermodal nodes in Spain

- Eco-incentive *scheme* to reduce external costs of transport
- Boosting Railway Motorways

The transport of goods in Spain is mainly carried out in an unimodal manner, using a single mode of transport, mainly road. However, when goods are required to be transported over longer distances, such as between countries, multimodal transport is used, which combines different modes oftransport such as road, rail, sea or air freight. Intermodal transport plays an important role in this typeof transport, allowing goods to be transferred from one means of transport to another through the use of Intermodal Transport Units (ITUs), such as swap bodies, semi-trailers and standardised containers.

In Spain, rail freight has a low modal share, accounting for only 4.8 % of the total tonne-kilometres transported by rail in 2019. This is significantly lower than the European average of 17.6 %. In 2018, the European rail system transported around 1.600 million tonnes of freight, of which Spain contributed 28 million tonnes,representing 1.7 % of the EU total. Renfe Mercancías, SME, S.A. was responsible for 18.3 million tonnes.

On the other hand, the Goods 3081 initiative will boost rail freight transport as the backbone of multimodal logistics chains, the scope of which is the rail network on which freight traffic is circulating or likely to circulate, mainly the General Interest Rail Network and privately ownedshippers. To this end, it identifies short- and medium-term actions and measures, the implementation of which makes it possible to increase the modal share of rail freight from the current 4 % to 10 % in 2030, reducing thenon-gative externalities of transport, including:

- Providing an efficient and competitive rail network, prioritising the most impactful actions such as: extension of track sections for trains of 740 m, electrification to 25 kV of non-electrified freight lines, upgrading and upgrading of lines already electrified, and actions on arterial networks to improve freight traffic.
- Increase the performance of rail freight terminals by developing rail freight hubs to boost intermodality, adapting them to the requirements of logistics chains, meeting the needs of companies and crews, goods and vehicles. The aim is to have a network of strategic intermodal nodes in 2030.
- Strengthen rail connections with ports, boosting the actions foreseen in the FFATP, and analysis of terminal spaces to boost logistics spaces for urban freight distribution.
- Improve capacity management by removing bottlenecks, encouraging longer train movements and prioritising actions to reduce operations.
- In order to promote international rail freight traffic, enhance multimodality through the provision of corridors for rail motorway services – both in standard and Iberian gauge – including gauging analysis and the suitability of routes to enable these services.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure has as its objective **cumulative final energy savings over the period 2021-2030** the amount **of 4.403,1 ktoe** out of a total of 19.938,9 ktoe representing the total transport sector.

c) Sectors addressed

This measure is aimed at companies and entities, public and private, with fleets of roador rail transport vehicles, goods or construction and service vehicles. The transport and logistics sector, according to ICEX data, accounts for 7.9 % of national GDP, with a turnover of 111.000 million and a high concentration of 197.000 companies.

d) Eligible actions

81Goods 30

Eligible actions include:

- The definition, programming and implementation of actions for the progressive electrification of unelectrified rail freight lines, as well as the renewal of the various elements of the electrification system on lines already electrified, improving the operational, energy and environmental efficiency of rail freight transport.
- Implementation of fleet management and freight monitoring systems, allowing better planning and optimisation of operations.
- Direct connections to ports, prioritising connections with ports that already concentrate a major railway activity and whose current accesses have outdated configurations that limit traffic growth.
- The definition, programming and implementation of actions on the arterial rail freight network around large cities, where freight traffic shares capacity with passenger traffic, especially with Cercanías.
- Creation of Railway Motorways (AF). FAs are rail freight services loading road or semi-trailers using specialised wagons. They are a segment of combined rail-road transport in addition to maritime containers and swap bodies. It therefore aims to provide a competitive logistics solution by exploiting the synergies between these two modes of transport, resulting in operational and external cost savings. In July 2024, the MadridValencia AF was launched, which will also link the Mediterranean and Cantabrian corridors, and will continue the Motorways of the Sea linking the Port of Valencia with Italy and towards the centre of the peninsula. In addition, the Adif Rail Motorways Office is analysing up to 18 routes for which the private sector has shown interest.

e) Policy mechanisms

† **Legislative measures**:

  - Draft Sustainable Mobility Act
  - Safe, Sustainable and Connected Mobility Strategy December 2030, 2021
  - Law 7/2021 on Climate Change and Energy Transition

- **Public aid programmes**: non-repayable aid programmes for enterprises.
- Actions to digitalise transport82:

  - Interoperability in rail freight.
  - Promotion of transport intermodality.
  - Modernisation of rail freight equipment.
  - Safe, sustainable and connected road transport.
  - Digitalisation of transport.

- **The PPA system** will make it possible to invest in the most efficient way possible for persons subject to the SNOEE in actions, both replicable and individual, by issuing and settling the corresponding certificates; for example, in actions to upgrade, renew or upgrade railway lines, which increase the efficiency of the network and make rail freight more competitive over other modes.
- **Agreements**: Signature of port connection agreements which do not currently have a signed agreement. These agreements lay down the rules for the physical and functional connection of Adif's infrastructure and the public authorities which make up the ferro-port complexes.

82 Sustainable and digital transport support programme: call for aid to undertakings in competitive competition

- **Communication**: development of demonstration and promotion activities aimed at businesses. Citizens' communication campaigns to promote shared mobility services, efficient driving and rational use of transport modes.
- **ECO-INCENTIVE**: The development of an eco-incentive programme shall be carried out by providing public support and subsidies to users or transport operators where there are reasons of social or environmental interest and without market distortion, corresponding to the Recovery and Resilience Facility, established by Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021, as this programme is included in Component 6 of the PRTR – financed by the European Union – NextGenerationEU.

f) Financial needs and public support

MITRAMS, under the PRTR, Component 6, plans EUR 2.988 million in rail corridors, including EUR 1.101 million of direct investment in rail infrastructure not included in the core network, EUR 217 million in intermodal terminals, and EUR 408 million in rail access outside interoperable ports and sidings.

In addition, the CAE system will be involved through standardised actions (fiches) or individual actions involving the replacement of 100 % road routes to routes with increasing participation by rail.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain MITRAMS, MITECO and, where appropriate, together with the Autonomous Communities, in accordance with a co-management and co-financing model that respects the distribution of competences in Spain.

REFURBISHMENT OF THE ROLLING STOCK OF MEANS OF TRANSPORT BY MORE EFFICIENT MEANS OF TRANSPORT, AND EFFICIENCY IMPROVEMENTS IN MANAGEMENT

a) Description

The objective of this measure is to increase the effectiveness and efficiency of the transport system, promoting intermodality, reducing energy consumption while limiting environmental externalities (air and noise pollution) and contributing to the long-term decarbonisation of the economy, mainly through the progressive electrification of transport, avoiding the creation of public funding mechanisms to subsidise the purchase of fossil-fuelled vehicles.

In this regard, the NECP envisages for the coming years innovation in new mobility systems that will be based on digital solutions, as well as smart use of data to make the transport system safer, more efficient and more sustainable. Such solutions may be applied across the board, both in termsof navigation assistance for road land transport, automation of the rail passenger system or strategic elements of the maritime fleet.

In the rail sector, in particular, digitalisation and energy efficiency are two key aspects in rollingout and improving the sustainability of this sector. The implementation of intelligent rail traffic management systems facilitates better train planning and coordination, optimises track capacity, reduces waiting times and improves the operational efficiency of the system. In turn, pre-dictive digitalisation can be implemented by using sensors and monitoring technologies to collect real-time data on the state of trains and railway infrastructure.

In the field of land freight transport, digitalisation will lead to improved productivity, reduced operatingcosts as well as greenhouse gas emissions. In this regard, the deployment of technologies such as the Internet of Things (IoT), artificial intelligence (AI) and real-time data analytics will provide accurate information on vehicle performance, fuel consumption or route efficiency, including by facilitating data-driven decision-making to optimise logistics operation.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The objective of the measure is additional savings to that resulting from the natural renewal of the fleet equivalent to **3.105 ktoe of cumulative final energy savings** over the period 2021-2030,out of a total of 19.938,9 ktoe of the total transport sector, promoting fleet renewal towards more efficient vehicles.

c) Sectors addressed

This measure targets the general public and companies with vehicle fleets.

d) Eligible actions

The eligible actions in the measure include:

- Purchase of vehicles and road transport services
- Renewal of railway equipment
- Maritime fleet renewal and equipment

e) Policy mechanisms

† Legislative measures:

- Law 7/2021 of 20 May on Climate Change and Energy Transition
- **New $CO_{2\ \text{emission regulation}}$.** The amendment of Regulation 2019/631 on CO_2 emissions from new and light commercial passenger vehicles, by Regulation 2023/851 as part of the 'Fit for 55' package, means that manufacturers register vehicles in 2025 with 15 % less $CO2_2$ on average compared to the limit set in 2020 and 2030, achieving reductions of 55 % in passenger car registrations and 50 % in light commercial vehicles. In addition, from 1 January 2035, the average emissions of the new passenger car fleet and the newlight duty fleet should lead to a 100 % reduction in emissions compared to the target in 2021.

  Similarly, Regulation (EU) 2024/1610 of the European Parliament and of the Council of 14 May 2024 amending Regulation (EU) 2019/1242 as regards strengthening$_{\text{the}}$ CO 2 emission standards for new heavy-duty vehicles has particular relevance in the renewal of the heavy-duty vehicle fleet towards more efficient vehicles and introduces new targets for 2030, 2035 and 2040.

- **Royal Decree-Law 24/2021** of 2 November transposing, inter alia, Directive (EU) 2019/1161 of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles and setting targets for the purchase of clean vehicles from Member States.

- **Funding programmes**: Creation of funding instruments, through partnership agreements with financial institutions, aimed at SMEs and self-employed in the freight transport sector and taxi services, to encourage the renewal of their vehicles as they may encounter difficulties in finding funding on ordinary channels, incentivising such renewal to move towards low-emission technologies.

- Other measures in the field of public and private sector
  - Green public procurement of road transport vehicles and services
  - Incentives for the renewal of the road transport fleet
  - Green public procurement in other modes of transport
  - Renewal of railway rolling stock
  - Renewal of the maritime fleet and its equipment

- Low-emission vehicles, machinery and equipment at airport terminals

f) Financial needs and public support

The associated total investment by individuals and businesses is estimated at EUR 76.680 million[83] for the period 2021-2030.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure are the MITRAMS and the Ministry of Finance, responsible for the tax reform of the General State Administration, the local authorities and theAutonomous Communities, responsible for certain taxes affecting the car, such as the Tax onMechanical Tracking Ve Hos (IVTM) and the Special Tax on Certain Means of Transport (IEDMT) or registration tax. The Directorate-General for Traffic and MITECO are responsible for updating the environmental labelling of vehicles.

MEASURE 2.4. IMPROVING THE EFFICIENCY AND SUSTAINABILITY OF PORTS

a) Description

The objective of this measure is to reduce the consumption of energy, and emissions associated with their production, in buildings and services provided in ports including publicly owned ports, and in activities carried out by port companies.

Port infrastructure actions will involve improving the insulation and energy use of buildings, using efficient lighting systems, implementing low-power air-conditioning equipment, andefficient port facility logistics and logistics.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure will provide savings in the period 2021-2030 of **1.984,9 ktoe of savings** out of a total of 19.938,9 ktoe.

c) Sectors addressed

Services, technology and construction companies operating in the port field.

d) Eligible actions

The eligible actions in the measure include:

- Innovative projects in more energy efficient management in ports.
- Infrastructure in ports.
- More efficient port services
- Low-emission craft, vehicles, machinery and equipment in the port environment
- Training and awareness-raising

(e) Mechanisms for action

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

† **Legislative measures**:

83 The total associated investment has been calculated taking into account the total amount of the new vehicle.

- Law 7/2021, of 20 May, on climate change and energy transition.
- Draft Sustainable Mobility Act
- Safe, Sustainable and Connected Mobility Strategy December 2030, 2021
- Strategy for the sustainability of the port system of State Ports

† **Other Accompanying Measures**:

We propose below the measures that Puertos del Estado has included in the energy efficiency section of its strategy for the sustainability of the port system.

- Institutional recommendations: Publication of an Energy Management Guide in ports,rewards on energy efficiency measures.
- Economic incentive: Subsidy on the activity rate of operators that signwith the Authority For best practice agreements, incentivising energy-saving measures in energy-intensive activities.
- Energy procurement and marketing: Progressive regularisation of the tasks of distributingand composing energy in ports. This is intended to shift actual energy market prices to port users, thereby achieving a more efficient use and management of energy by port users.
- Infrastructure: Investments in the following improvement actions:

  1) Control: Real-time measurement and control at all consumption points.
  2) Distribution: Improvement of the port distribution and processing network.
  3) Lighting: Adaptation to LED systems, with regulation according to the level of activity, in publicroads and buildings.
  4) Air-conditioning: Improving the insulation of the buildings of the port authorities and air-conditioning by heat pump, with geothermal use being explored in some ports.

- These decarbonisation developments should be developed in such a way as to ensure that they will not affect protected areas, species and habitats (both the introduction of alternative fuels or energy sources, and the development of new infrastructure and associated discharges).

► **Public aid programmes**:

MITRAMS, under the PRTR, Component 6, will invest EUR 306 million to improve the accessibility and sustainability of ports.

► **Economic incentives**:

These actions may be beneficiaries of the PPA system.

(f) Responsible

The AGE, through MITRAMS, Puertos del Estado and the port authorities, the Autonomous Communities in the field of ports under its competence and those responsible for private marinas.

MEASURE 2.5. PROMOTION OF ELECTRIC VEHICLES

a) Description

The objective of this measure is to make the transport sector more energy efficient and reduce the energy consumption of the vehicle fleet, through the electrification of the fleet, which will be achieved by gradually replacing combustion vehicles with electrically powered vehicles (including both electric vehicles with batteries and those with fuel cells and consuming green hydrogen), enabling a greaterreduction of renewables in the transport sector.

As part of the Fit for 55 package, the European Commission, together with the Council and the European Parliament, hasshortened the ban on the sale of new vehicles that are not zero-emission from 2035 on Community territory, in accordance with Regulation (EC) No 2023/851 on COVs reductions in new passenger cars and on newlight commercial vehicles. This agreement brings forward the commitment made by Spain in Law 7/2021 of 20 May on Climate Change and Energy Transition to ensure that, by 2040, all vehicle sales will be vehicles with emissions of 0 $gCO_{2\ per}$km.

At the end of 2023, the share of electric vehicles placed on the market in Spain was 12 %, including battery electric vehicles, plug-in hybrid vehicles and extended range electric vehicles.

Under the PRTR, Spain has accelerated the measures, both legislative and financial support, that make itpossible to reach penetration of electric vehicles to meet the objective set out in the 'Fit for 55' agreement.

Massive electrification of the vehicle fleet will be achieved when parity in terms of total ownership costs is reached between electric vehicles and combustion vehicles (either by matching sales prices provided by manufacturers, or by the existence of fiscal incentives and support programmes) and when there is sufficient publicly accessible recharging infrastructure deployment, among other factors.

In this regard, a wide range of legislative reforms have been carried out to accelerate the deployment of publicly accessible recharging infrastructure, as summarised in paragraph (f) of this measure.

Furthermore, it is important to mention that in the overall framework of the PRTR, which outlines the roadmapfor moderating the Spanish economy, one of the thirty action lines is Component 1: Sustainable, safe and connected mobility shock plan in urban and metropolitan environments, including, but not limited to, the massive deployment of recharging infrastructure as key to boosting the electric vehicle. This shock plan will make itpossible to launch the electrical mobility penetration targets that Spain had set at 2023 and 2025.

With regard to the promotion of the industrial value chain, on 13 July 2021, the Council of Ministers approved the Agreement declaring as a Strategic Project for Economic Recovery and Transformation the development of an electrical and connected vehicle manufacturing ecosystem (PERTE VEC) as anintegral initiati on the industrial value chain of electric and connected vehicles with a clear and defined objective: the creation of the necessary ecosystem for the integrated manufacture and development of electric and connected vehicles in Spain. To this end, the PERTE VEC will make it possible to articulate the public investments of the differentrapporteurs of the plan, and to coordinate the actions of the different links of the value chain, in orderto achieve the desired IMPAC in terms of efficient transformation of the sector. To this end, the PERTE VEC lists MOVES incentive programmes as enabling measures which, without acting directly on the value chain, contribute both to the creation of new mobility and to the development of electric vehicles, in this case, enablingthe electric vehicle fleet, the deployment of infrastructure and innovation and new business models in electric mobility to be boosted.

Also under the PRTR and as part of Component 9, the Hydrogen Roadmap has been adopted: A focus on renewable hydrogen, which plans to encourage the use of green hydrogen in certain niches in the hard-to-decarbonise transport sector.

A key aspect for the progressive deployment of public recharging infrastructure is Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU,with binding objectives of both power and capillarity deployment of recharging points for all Member States.

In this context, the Task Force for the deployment of charging infrastructure (GTIRVE) has been set up as the deployment governance body in Spain. At the most recent meeting to date held in July 2024, participants presented the state of play, progress made and future, and identified needs, as well as next steps to be taken in the framework of GTIRVE.

The development of electric vehicles and their charging infrastructure also has an impact on theenergy curity dimension (see

Measure 3.4), as well as on the provision of complementary services to the electricity system, giventhe development of bi-directional charging (V2G and V2H) and aggregation, which will allow for a greater integration of renewables (see Measures 1.3 and 4.4). This will require ensuring interoperability between vehicles, different recharging points and the electricity grid.

Finally, mention the alignment of the vehicle fleet electrification targets with the Roadmap for the sustainable management of Mineral Raw Materials and action lines of the Spanish Circular 2030 Strategy. In particular, the recovery of materials such as lithium, nickel, cobalt and*retrofit*of vehicles will be new niches of activity in the electrical mobility ecosystem.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure will provide savings in the period 2021-2030 of **3.841,20 ktoe of savings** out of a total of 19.938,9 ktoe. The update of the NECP considers that **an electric vehicle fleet of 5.450.000 will be reached by 2030** (cars, vans, buses and motorcycles).

c) Sectors addressed

This measure targets the general public and companies with vehicle fleets, as well as companies active in thefolding, operation and provision of charging infrastructure services.

d) Eligible actions

The eligible actions in the measure include:

- The purchase of new electric vehicles
- The deployment of electric vehicle charging infrastructure
- Innovative projects in electric mobility

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

† **Legislative measures**: Promoting electric mobility requires an adaptation of the regulatory framework to accelerate the deployment of charging infrastructure. The following measures are listed in this regard:

- Royal Decree 184/2022 of 8 March 2006 regulating the provision of energy charging services for electric vehicles.
- Establishment of the obligation to install high-power recharging points in certainservice units on the basis of a volume of fuel sales (stations with the highest volume of traffic), by Law 7/2021 of 20 May on Climate Change and Energy Transition and Royal Decree-Law 29/2021 of 21 December 2010 adopting urgent measures in the fieldof energy for electric mobility, self-consumption and the deployment of renewable energies.
- Royal Decree 1052/2022, of 27 December, regulating low-emission zones. Estimatethat local authorities will ensure that they have at their disposal tools that make it easier for undertakings operating recharging services, in competitive and transparent conditions, to process and locate recharging points for electric vehicles, accessible to the public within and outside the BE zones, so thata minimum charging network is in line with the growth of the electric vehicle fleet.
- Obligation to deploy recharging points in car parks attached to existing buildings in the tertiary sector with more than 20 parking spaces, through the publication of Royal Decree-Law 29/2021 of 21December.
- Obligation to install pre-installation and charging points in car parks for new buildings, through the amendment of the Technical Building Code through Royal Decree 450/2022.
- Elimination of the exclusivity of contracts for the installation of recharging points at service stations, as laid down in Royal Decree-Law 27/2021 of 23 November, extending certain financialmeasures to support the recovery.

- Declaration of public benefit for charging infrastructure facilities with a power of more than 250 kW, by means of Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery.

- Removal of the requirement for a prior building permit for charging points, replacing it with adeclaratory declaration, in accordance with Royal Decree Law 29/2021 of 21 December 2007.

- Simplification of the regulatory procedure for the installation of charging points on State roads, in accordance withOrder TMA/178/2020 of 19 February amending the Order of 16 December 1997 regulating access to State roads, service roads and the construction ofservice installations; in addition, Order TMA/277/2023 of 21 March 2014 includes the possibility of submitting a declaration of responsibility to certify that the holder of the authorisation for the main installation holds such ownership and that it agrees with the installation of charging infrastructure in that installation.

- Regulation (EU) 2019/1242 amended Directive 96/53/EC by allowing to increase the maximum permissiblemass of alternatively fuelled or zero-emission vehicles to amass of 1 tonnes or 2 tonnes respectively, as well as to increase the maximum permissible mass forcombinations of vehicles including alternatively fuelled vehicles or zero-emission vehicles to a maximum of 1 tonnes or 2 tonnes respectively. DGT instruction 19/V-133 will be updated in accordance with Regulation (EU) 2019/1242.

- **Introduction of an e-credit mechanism that** recognises electricity, among other energy alternatives, for the supply of vehicles, in line with the framework set out in the proposal to amend the Renewable Energy Directive.

  This amendment provides that Member States shall implement a mechanism allowing fuel suppliers in their territory to exchange credits for the supply of renewable energy to the transport sector. In this way, economic operators that supply renewable electricity to electric vehicles through, among other energy sources, public charging stations will obtain a number of lessonsthat can be counted towards the objectives set for the decarbonisation of the transport sector.

  The current credit scheme (SICBIOS) is designed to account exclusively for biofuels used in transport, as a result of the obligations imposed on those required to prove compliance with the targets laid down in Royal Decree 1085/2015 of 4 December 2003 on the promotion of biofuels, and in its most recent amendment by Royal Decree 376/2022 of 17 May 2009 regulating the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels, as well as the system of guarantees of origin for renewable gases. Thus, sales or consumption targets apply only to biofuels, leaving aside the possibility of using other mature renewable fuels such as renewable electricity or new generation ones, such as hydrogen and other renewable synthetic fuels, as there is no obscuration on thesefuels or a mechanism for their accounting.

  The introduction of this new e-credits mechanism will make it possible to count these appropriations in order to cover the obligations arising from the transposition of the proposed amendment to the Renewable Energy Directive, as well as the creation of an enabling framework for encouraging the use of vehicles onveal.

  In this regard, between June and July 2024, the prior public consultation on the 'Programme forthe deployment of publicly accessible charging infrastructure on roads (MOVES programme) took place under the European Union-funded Recovery, Transformation and Resilience Plan – NextGenerationEU', whose possible alternative solutions to support the deployment of publicly accessible recharging infrastructure are the design of the e-credits mechanism.

† **Other measures to support the promotion of electric mobility**:

- An exemplary role for the administration, with obligations to renew the minimum fleet with zero or low-emission vehicles to be submitted by the various public authorities, in accordance with Law 24/2021 of 2 November 2007 transposing European Union directives on covered bonds, the cross-border distribution of collectiveinvestment ORGA, open data and the re-use of public sector information, the exercise of copyright and related rights applicable to certain online transmissions and retransmissions of television and radio programmes, temporary exemptions for certain imports and supplies, for consumers and for the promotion of clean and energy-efficient road transport vehicles.

- Creation of the GTIRVE Group as the governance body for infrastructure deployment in Spain. It represents public

administrations and sectoral associations across the electrical mobility value chain. In addition, the creation of specific working groups between the various actors involved to improve coordination, cooperation and collaboration in promoting files for the deployment of electric vehicle charging infrastructure, both light and heavy.

- Publication of a new Circular setting out the methodology and conditions for access andaccess to the transmission and distribution networks of electricity demand facilities

□ **Public support**programmes: design of non-repayable support programmes that multiply the budget made available to individuals and companies for the purchase of electric vehicles – including transport poverty and support for vulnerable people (measure 6.6) – as well as the installation of charging points and innovative projects.

In the period 2020-2023, Next Generation funds are available under the PRTR, which allow it tocope with the penetration of electric mobility thanks to an unprecedented volume of funds. The programmes launched include:

- MOVES II and MOVES III programme to incentivise the purchase of light electric vehicles and the installation of recharging points, with an envelope of up to EUR 115 million and EUR 1.550 millionrespectively.
- MOVES FLOTAS programme, with incentives for companies that purchase at least 25 electric vehicles ligeros and operate in at least two Autonomous Communities, to renew their fleet and have recharging on their facilities, endowed with EUR 50 million in its first call and in its 2th call with a further EUR 50 million and in its 3th call with EUR 30 million. A new call is planned in the course of 2024.
- EUR 400 million programme for the transformation of heavy goods and passenger fleetsby road.
- 2 single MOVES programme, aimed at incentivising unique electric mobility projects, with EUR 100 million for its first call and EUR 264 million for the second call.

□ Economic incentives:

- Relaxation of the toll and charge for charging electric vehicles, via CNMC Circular 3/2020
- The possibility for municipalities to introduce tax credits for the activity of charging vehicles, by means of Royal Decree Law 29/2021 of 21 December 2003.

► **Taxation**: The Ministry of Finance, in the framework of gradualism in the adoption of measures, and the opportunity and appropriateness of mitigating the environmental externalities of fossil fuels, will promote different tax incentives with the aim of achieving greater penetration of the electric vehicle.

An example of such incentives is set out in Royal Decree-Law 5/2023 of 28 June, in which personal income taxdeductions have been granted to promote the purchase of electric vehicles by private individuals and the installation of charging points. In the area of social security tax, in order to boost the electrification of mobility, a tax incentive is introduced tosee charging facilities, both for private use and those accessible to the public, for new electric vehicles with normal power or high power, as defined in Article 2 of Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure andrepealing Directive 2014/94/EU, allowing for their accelerated depreciation provided that they enter into operation in the financial years 2023, 2024 and 2025.

► **Communication**: design of an *ad hoc* communication strategy focusing on providing information on electric vehicle, price and location of charging points, supply, vehicle performance, etc.

It is important to mention the ongoing European projects in which Spain participates: PSA “Data collection related to reject/refuelling points for alternative fuels and the unique identification codes related to E-Mobility actors” and PSA “Fuel price comparison”, both funded by the CEF European call for proposals involving 16 European countries. The first project has made it easier to have the national register of the network ofrelay points, called RIPREE, with a visual map of these points being made

available on the geoportal of the MITECO website84 and at the National Access Point (NAP) of the Directorate-General for Traffic, as well as their unique code identification, providing their coordinates and other relevant information for citizens. The second has been translated into website euros/100km85, which will allow citizens to have information enabling them tostop the refuelling costs of the different types of vehicles, thereby responding to the requirements of Regulation (EU) 2023/1804.

The communication strategy will use the most impactful channels that are specialised and non-specialised: MITECO geoportal, web platforms, smartphone applications, social media, conferences and events.

f) Financial needs and public support

The total investment associated with the penetration of the electric vehicle will be in the order of EUR 114.407 million86. The estimated public financial support for the development of this measure in the period 2021-2025 (with Next Generation EU funds) amounts to EUR 2.000 million to boost the electrification of light vehicles, plus EUR 400 million for the programme for the transformation of heavy-duty vehicle fleets. In addition, other funding lines targeting municipalities (EUR 1.500 million) and the Autonomous Communities (900 million) include as eligible actions the purchase of zero-emission vehicles for public passenger transport and waste collection vehicles, as well as the installation of electric charging points in their depots for such vehicles. In the period 2025-2030, it is estimated that the price parity will have been reached in the case ofli geros vehicles and no public support as non-repayable aid for the purchase of vehicles will be required; although support schemes (fiscal, e-credits, etc.) will be needed to further boost the deployment of charging infrastructure, especially for heavy-duty vehicles due to their power requirements, both fleet and publicly accessible ones, and in 'shadow' areas, as these investments in charging infrastructure are often less attractive for the private sector. In addition, such investments in public electric charging infrastructure should be accompanied by the necessary reinforcements in the electricity transmission and distribution networks.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain MITECO, which iscoordinated with other ministerial departments and, in particular, with MITRAMS, MINTUR and Minis teriode Hacienda y Servicio Pública, together with the Autonomous Communities, in accordance with a model of co-management and co-financing of legislative and energy efficiency measures and actions that respect Spain's distribution of competences. The local authorities shall be the administrations involved in the measure as a result of the exercise of their powers in the field of air quality control in cities. Industry sector

MEASURE 2.6. IMPROVEMENTS IN TECHNOLOGY AND PROCESS MANAGEMENT SYSTEMS OF NON-INDUSTRIES ENERGY INTENSIVE

a) Description

The measure aims to facilitate the penetration of final energy saving techniques and technologies, mainly in small and medium-sized enterprises (SMEs) and large enterprises in the industrial sector that are not considered to be energy intensive. This measure will improve the energy efficiency of industrial processesand will lead to final energy savings and thus significant GHG emission reductions.

The measure will promote, on the one hand, greater investment in both renovation and tualisationand in replacing less energy-efficient industrial equipment and installations with others using highly energy efficient technologies or, directly, best available techniques (BAT). Itwill warmly replace all types of systems that consume energy in industrial processes or produce or transport

84 Hydrocarbon geoportal: Map of fuel prices for petrol stations and electric charging points

85 Comparative information on the cost of motor fuels in EUR/100km

86 **The total associated investment has been calculated taking into account the total amount of the new vehicle**. This concept **is not the one used in the assessment of the economic impact of the NECP** (see chapter 4). The aforementioned assessment takes into account only the difference between the investment that would be made in a conventional vehicle when renewing the vehicle (baseline scenario) and that made in the Plan's target scenario when purchasing an electric vehicle (more expensive than the previous one). That difference is considered to be the 'economic impact of the plan' and is obviously much lower than that resulting from taking into account the total amount of the new vehicle.

steam or other heating fluids.

On the other hand, it will also promote more investment in the implementation ofmore energy management facilities in industry; these systems must include measures to measure the rangeof energy consumption and the installation of elements for regulating and controlling the process parameters and the implementation of IT and digital systems for analysis, regulation and control, in order to ensure optimal operation of the installations, reduce energy consumption and costs and providetraining quickly and accurately, which is necessary to improve the energy management ofindustrial installations. In all cases, energy management systems must comply with standard UNE-EN ISO 50001 on energy management systems or similar and commonly accepted standards. In particular, according to Article 11 of the Energy Efficiency Directive 2023/1791, an energy audit will be required for companies consuming more than 10 TJ/year and an energy management system for those consuming more than 85 TJ/year.

The new and additional final energy savings in the industrial sector during the 2021-2030 period of application of the Energy Efficiency Directive, which coincides with the period covered by this NECP, will result from the mobilisation of new investments in equipment, systems and processes and the implementation of energy management systems in the manner described, based on the actions mobilised, inter alia, by the National Obligations System (SNOEE), either through investments justified by energy saving certificates (EPCs) or through support programmes financed under the EEEF. In addition, savings obtained as a result of the application of other public funds, such as the PRTR, Components 12, 13 and 14, the General State Budget or the 2021-27 ERDF funds, will be counted, always ensuring that there will be no double counting of savings in relation to the SNOEE.

In line with the above, there are several strategic projects for economic recovery and transformation (RERTE) that support actions on energy efficiency and decarbonisation of national industry. In particular, it should be noted that:

- Industrial decarbonisation PERTE, approved by the Council of Ministers on 27 December 2022, which has as one of its objectives the improvement of energy efficiency in industry, as this is an essential element in helping the decarbonisation and viability of the manufacturing sector, by incorporating the best available technologies into industries and the deployment of energy management systems. It promotes greater energy efficiency through its transformative measures *A. Comprehensive action aid lines for the decarbonisation of the manufacturing industry* and *D. Support for the development of new highly efficient and decarbonised manufacturing facilities*.
- PERTE for the shipbuilding industry, approved by the Council of Ministers on 15 March 2022, which has as its key challenge to diversify the shipbuilding sector into new products, its digitalisation, the improvement of its environmental sustainability and the empowerment of its employees. Under the action area 'Transforming*projects in the value chain*', the projects submitted are requested to incorporate at least one primary action or project demonstrating the development of sustainability (circular economy, energy efficiency and environmental improvement).
- PERTE Aerospace, approved by the Council of Ministers on 22 March 2022, which sets among its specific objectives and actions to promote innovation, sustainability and digitalisation actions in the aeronautics and space sectors (Action 14), supporting the decarbonisation of air transport.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to **achieve a cumulative final energy saving of 9.283,5 ktoe** in the period 2021 – 2030.

c) Sectors addressed

This measure is aimed at companies in the industrial sector which are not considered to beenergy intensive enterprises, preferably belonging to the manufacturing industry, as well as energy service companies that make investments on behalf of customers.

d) Eligible actions

The eligible actions will be those that achieve a reduction in CO_2 emissions and finalconsumption, by improving industrial equipment and processes and air-conditioning in factories, by setting up management systems, or by carrying out training, dissemination and

awareness-raising activities.

By analogy with the implementation programmes for the period 2014-2020, actions deemed not economically viable shall not be eligible, meaning that actions where the period of simple loss of the eligibleinvestment exceeds the useful life of the implemented installation shall not be eligible.

Similarly, actions that do not comply with the principles and methodology for accounting for savings laid down in the Energy Efficiency Directive will not be eligible. Thus, energy efficiency tents thatact on the direct combustion of fossil fuels will not be eligible.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

- **Energy Savings Certificates Facility, PPAs**
- **Public aid programmes**: programmes offering non-refundable aid or repayable low-interest loans within the framework of Community legislation on State aid.
- **Voluntary agreements**: the signing of voluntary agreements with both associations representing less energy intensive sub-sectors and trade union organisations can lead to faster adoption of efficient technologies in the industrial sector.
- **Normative**:
  - Law 7/2021 of 20 May 2003 on Climate Change and Energy Transition.
  - Preliminary draft Law on Industry and Strategic Autonomy, already subject to the hearing process andpublic information.
  - Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency.
  - Amendment of Directive 2010/75/EU of 24 November on industrial emissions (integrated pollution prevention and control), where best practices in gender efficiency are expected tobecome mandatory.
  - As well as the amendment of other Directives of the 'Fit for 55' package and their corresponding transposition into Spanish law.
- **Promoting R & D & I:** supporting research and technological development of solutions to processes using cleaner energy sources or drastically improving the energy intensity of the process.
- **Improvement in organisations:** incentivising the introduction of Energy Management Systems (EMS) to identify improvement actions and implement the most cost-effective ones in the short term
- **Training:** there is a need for trained professionals in the deployment of new decarbonisation and energy efficiency technologies.
- **Awareness**: dissemination of the implications of the energy transition for business survival, climate and jobs.

(f) Financial needs and public support

† **National System of Obligations**:

- **The Energy Saving Certificate System**, developed in Measure 2.23, will make it possible to invest the parties subject to the SNOEE as efficiently as possible in actions, both replicable and individual, by issuing and settling the corresponding certificates to promote energy efficiency in industrial processes that reduce the energy consumption ratio per unit of product or service or to incorporate energy management systems, as well as to reduce the payback period againstenergy efficiency.
- Support programmes under the EENF

† **Alternative measures**:

- Support programmes under PERTE for industrial decarbonisation, PERTE for the shipbuilding industry and PERTE aerospace.
- **Other public support programmes: non-repayable**aid schemes or low-interest repayable loans within the framework of Community legislation on State aid that might be outside the National Obligations System.

(g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain MITECO and MINTUR, in coordination with other ministerial departments responsible for industrial policy, together with the Autonomous Communities and local authorities, in accordance with a co-management and co-financing model for energy efficiency measures and actions that respects Spain's distribution of competences.

MEASURE 2.7. IMPROVEMENTS IN TECHNOLOGY AND PROCESS MANAGEMENT SYSTEMS IN INDUSTRIES ENERGY INTENSIVE

a) Description

The measure aims to facilitate the penetration of final energy saving techniques and technologies in companies that aregendered in the industrial sector. This measure will make it possible to improve the energy efficiency of industrial processes, ensuring final energy savings and therefore significant GHG emission reductions.

The measure will promote, on the one hand, greater investment in both renovation and actualisation andin replacing those industrial equipment and installations with lower energy performance with those using highly energy efficient technologies or, directly, incorporating the best available techniques(BAT). It shall provide for the renewal or replacement of all types of energy-consuming systems in industrial processes or producing or transporting steam or other heating fluids.

It will also promote more investments in the deployment of energy management systems in industry. These systems should include measuring energy consumption variables, regulating and controlling process parameters and the tools needed for the analysis of all data collected, in order to be able to manage the operation of installations in an energy optimal manner, reducing energy consumption and associated costs and providing information quickly and accurately. In all cases, energy management systems must comply with standard UNEEN ISO 50001 on energy management systems or similar and commonly accepted standards. In particular, according to Article 11 of Directive 2023/1791 on Energy Efficiency, an energy management system will be required for those consuming more than 85 TJ/year.

The new and additional final energy savings in the industrial sector during the 2021-2030 period of application of the Energy Efficiency Directive, which coincides with the period covered by this NECP, will result fromnew investments in equipment, systems and processes and the introduction of energy management systemsin the manner described above, on the basis of the actions mobilised, inter alia, by the National Obligations System (SNOEE), either through investments justified by energy savings certificates (CAE) or through support programmes financed by the EEEF. In addition, savings obtained as a result of the application of other public funds, such as the PRTR, Components 12, 13 and 14, the General State Budget or the 2021-27 ERDF funds, will be counted.

In line with the above, the PERTE for industrial decarbonisation, approved by the Council of Ministers on 27 December2022, has as one of its objectives the improvement of energy efficiency in industry, as it is consideredessential to help the decarbonisation and viability of the manufacturing sector, through the incriminationin industries of the best available technologies and the implementation of energy management systems. It promotes greater energy efficiency through its transformative measures A. Integrated aid lines for decarbonising the manufacturing industry and D. Support for the development of new highlyefficient and decarbonised facilities.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to **achieve a cumulative final energy saving of 7.045,4 ktoe** in the period 2021 – 2030.

c) Sectors addressed

This measure is aimed at energy-intensive companies in the industrial sector, as well as companies that are energydefects that make investments on behalf of customers.

d) Eligible actions

The eligible actions will be those that achieve a reduction in CO_2 emissions andfinal consumption by improving industrial equipment and processes and air-conditioning in factories, setting up management systems or carrying out training, dissemination and awareness-raising activities.

By analogy with the implementation programmes for the period 2014-2020, actions deemed not economically viable shall not be eligible, meaning that actions where the period of simple loss of the eligibleinvestment exceeds the useful life of the implemented installation shall not be eligible.

Similarly, actions that do not comply with the principles and methodology for accounting for savings laid down in the Energy Efficiency Directive will not be eligible. Thus, with the exceptionof certain exceptions set out in Annex V to the new Energy Efficiency Directive, energy efficiency measures that deal with the direct combustion of fossil fuels will not be eligible.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets shall be as follows:

- **Energy Saving Certificate Facility, CAE.**
- **Public aid programmes: non-repayable**aid schemes or low-interest repayable loans or guarantees within the framework of the Community rules on State aid.
- **Voluntary agreements:** the signing of voluntary agreements both with associations representing the most energy-intensive sub-sectors and with trade unions can lead to faster adoption of efficient technologies in the industrial sector.
- **Normative:**
  - Law 7/2021 of 20 May 2003 on Climate Change and Energy Transition.
  - Preliminary draft Law on Industry and Strategic Autonomy, already subject to the hearing process andpublic information.

- Directive (EU) 2023/1791 on energy efficiency.
- Directive 2010/75/EU of 24 November on industrial emissions (integrated pollution prevention and control), as amended by Directive (EU) 2024/1785.

► **Promoting R & D & I:** supporting research and technological development of solutions to processes using cleaner energy sources or drastically improving the energy intensity of the process.

► **Training:** there is a need for trained professionals in the deployment of new decarbonisation and energy efficiency technologies.

► **Awareness** and dissemination of the implications of the energy transition for business survival, climate and jobs.

► National Obligations System:

- **The Energy Saving Certificate System**, developed in Measure 2.23, will make it possible to invest the parties subject to the SNOEE as efficiently as possible in actions, both replicable and individual, by issuing and settling the corresponding certificates to promote energy efficiency in industrial processes that reduce the energy consumption ratio per unit of product or service or to incorporate energy management systems, as well as to reduce the payback period againstenergy efficiency.
- Support programmes under the EENF

† **Alternative measures**:

- Support programmes under the PERTE for industrial decarbonisation
- Other public support programmes: non-repayable aid schemes or low-interest repayable loans within the framework of Community legislation on State aid that might be outside the National Obligations System.

f) Financial needs and public support

Public support is estimated at EUR 3.622 million.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain MITECO and MINTUR, in coordination with other ministerial departments responsible for industrial policy, together with the Autonomous Communities and local authorities, in accordance with a co-management and co-financing model for energy efficiency measures and actions that respects Spain's distribution of competences.

Housing sector

MEASURE 2.8. ENERGY EFFICIENCY IN EXISTING BUILDINGS IN THE RESIDENTIAL SECTOR

(a) Description

The measure aims to reduce the energy consumption of existing residential residential buildings for residential use through energy renovation actions. The renovation shall allow for the improvement of the energy rating of the building. This measure is fully consistent with the **long-term renovation strategy for buildings (ERESEE)**, drawn up by the MIVAU and updated in 2020, in accordance with Article 2a of Directive 2010/31/EU and **the State Housing** Plan, which is the basic tool for promoting urban and rural regeneration and renovation and has been implemented in cooperation with the Autonomous Communities.

This NECP considers that the certification of the energy performance of buildings (Royal Decree 390/2021 of 1 June 2015 approving the basic procedure for the certification of the energy performance of buildings, repealing Royal Decree 253/2013 of 5 April) is a very valuable tool for promoters of renovation actions when making new investments in existing buildings, irrespective of their use. However, in so far as the improvement of the energy rating of the building can be achieved by actingon the thermal envelope of the building or on thermal heating or air-conditioning and domestic hot water (DHW) systems, this Plan **prioritises investments in the thermal envelope** (façades, roofs and enclosures) over improvements in thermal installations, considering that the reduction of thermal demand must first be addressed in order to avoid oversizing the heating equipment or CLIqualification that must be met by applying *the energy efficiency* principle.

This measure was initially based on the Support **Programme for the Energy Rehabilitation of Existing Fairslaunched** in Spain in October 2013 under the name of the PAREER Programme, extended in May 2015 as PAREER-CRECE and in force until December 2018 under the name PAREER II. This programme has been considered a successful experience precisely because more than 85 % of thetwo channelled to energy renovation projects have been considered successful for actions to improve the gene efficiencyof the thermal envelope (PAREER-CRECE).

Currently, rehabilitation support in Spain is based on the PRTR support programmes. Component 2 of the Plan, led by the Ministry of Housing and Urban Agenda (MIVAU), lists all the programmes and fundstwo from NextGenerationEU funds under the Housing Rehabilitation and Urban Regeneration Plan.

This component of the PRTR includes the EUR 3.420 million support programme for the comprehensiverenovation of residential and residential buildings, which aims to boost the renovation of residential buildings,viendas and neighbourhoods.

In addition, Component 2 of the PRTR includes the support programme forenergy reuse actions in existing buildings (PREE) and the energy renovation programme for existing buildings in municipalities facing demographic challenges (PREE 5000 programme), led by the Ministry for the Ecological Transition and the Demographic Challenge through IDAE. These programmes give continuity to the programmes PAREER-CRECE and PAREER II and have a budget allocation of EUR 402.5 million and EUR 300 million respectively.

In addition, also included in the PRTR, the Support Programme for the Rehabilitation Offices and the Programme to aid the drafting of the existing building book for the renovation and drafting of renovation projectscover aspects of the renovation process that are not actions on the buildings, but which are notseverable for carrying them out.

Investments aimed at the renovation of buildings will also be mobilised through the Energy Saving Certificates System (CAE, measure 2.23), which will make it possible to invest the parties subject to the SNOEE as efficiently as possible in energy renovation of buildings, both replicable and singular, by issuing and settling the corresponding certificates.

The basis for public support is the building's energy performance certificate (CEEE), which contains a description of the building's energy characteristics as a starting point for an energy diagnosis.

It should be noted that the system for calculating the CSEE is under review for various reasons:

- First, work is ongoing to adapt scaling to criteria that more strictly reflect the desirability of making an investment to save energy; this is by assigning the best letters to those buildings with the lowest savings potential relative to the investment.
- Secondly, it is necessary to adjust the procedure for calculating the various recognised documents so that the energy consumption calculated under standardised conditions offered by the CSEE is closer to actual consumption, as it is now much higher.

In accordance with Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, and in particular Article 19 and Annex V thereof, the CEECs must contain information on all the elements susceptible to intervention from a geographical point ofview (thermal envelope, thermal heating, air-conditioning and domestic hot

water production, ventilation, lighting and control and management systems), as well as information on normal operating and occupancy conditions, thermal comfort conditions and indoor air quality, among others.

The EERC itself should include recommendations for the improvement of the optimal or cost-effective levels of the geneperformance of the building or a part of it and may include an estimate of the payback times of the investment over its lifetime.

The renovation activities referred to in this measure shall be carried out on the basis of the latest requirements set outin the Technical Building Code, as last amended by Royal Decree 450/2022 of 14 June 2003, and the Regulation on Thermal Installations in Buildings, as last amended by Royal Decree 178/2021 of 23 March 2007.

It is important to note here that the current annual savings accounting system results in a minimisation of the effect of investments in building renovation. This is because these investments are significant, but have a very small savings effect if only annual savings are counted, but much higher when taking into account the useful life period, which in the case of the thermal envelope is for decades. With the publication of Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, by 29 May 2026, each Member State shall establish a national trajectory for the progressive renovation of the residential building stock ensuring that the average primary energy use in kWh/(m².y) of the entire residential building stock:

- Is reduced by at least 16 %, compared to 2020, by 2030
- Is reduced by at least 20 % to 22 % compared to 2020 by 2035 at the latest
- By 2040, and every five years thereafter, is equivalent to or lower than a nationally determined value resulting from a progressive decrease in the average primary energy use from 2030 to 2050, in line with the transformation of the residential building stock into a zero-emission building stock

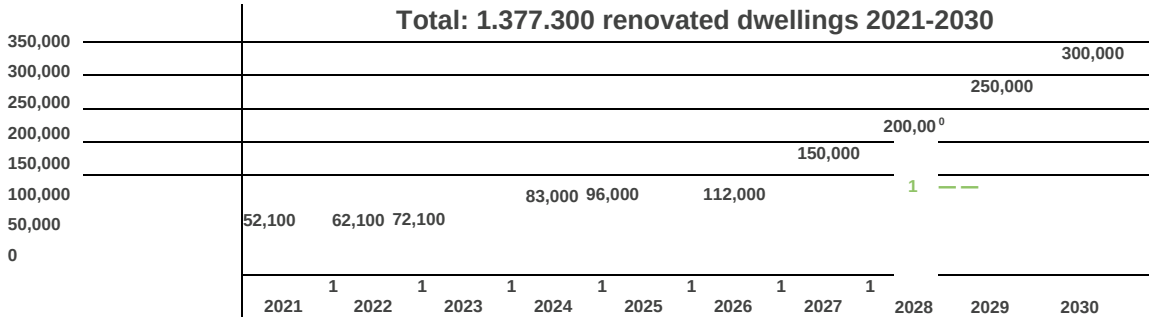
b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to **achieve 4.979 ktoe of cumulative final energy savings** over the period 2021-2030, out of a total **of 7.323,6 ktoe of savings** in the residential sector.

As a result of the aid programme for the comprehensive renovation of residential buildings and dwellings, 477.300 renovation actions are expected to be carried out throughout the period of application of the PRTR, implying an average rate of around 80.000 dwellings per year.

This quantitative planning is indicative and the decisive factor for the objectives of this Plan is the total genesavings achieved. The precise housing renovation ratios to be implemented for each year will beprecisely finalised in the National Building Renovation Plan, as laid down in Article 3 of the new Energy Efficiency in Buildings Directive, which is the responsibility of the MIVAU.

Figure 3.5. Indicative annual forecast of energy renovated dwellings 2021-2030



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

c) Sectors addressed

The beneficiaries of this measure shall be owners of existing buildings intended for housing, whetherphysical or legal, whether of a public or private nature, associations of owners or groups of associations of homeowners of residential residential buildings, companies operating, tenants or concessionaires of residential residential buildings and, in any case, energy service companies and energy communities.

d) Eligible actions

Eligible actions will be those that achieve a reduction in CO_2 emissions and final energy consumption by improving those services that have a greater weight on the energy consumption of buildings, such as heating, cooling and domestic hot water production:

- **Thermal envelope:** action will be taken on the thermal envelope of the building to achieve a reduction in the heating and cooling demand of the building. Energy efficiency actions may include, inter alia, façades, roofs, floors, external carpentry, glass and sunscreens.
- **Thermal installations:** action will be taken on thermal heating, air-conditioning, domestic hot water production and ventilation, which are regulated by RITE. The measure provides for the incorporation of thermal renewable energy sources to cover demand in accordance with the final renewable energy consumption targets considered in this Plan.
- Information and communication**technology (ICT):** use of monitoring, control and automation tools to manage energy efficient equipment:
- **Efficient heating and cooling networks:** Connection to efficient heat and cold networks enabling the supply of heat, cold and domestic hot water to the building from waste energy, renewable energy and other efficient systems.

Renovations, which may be at neighbourhood or building level, may include actions, on an indicative and non-exhaustive basis, such as:

- Replacement of heat and cold production equipment, movement of heating fluids, including improving thermal insulation of pipe networks and equipment to reduce losses in the transport of fluids.
- Installation of free outdoor air cooling and heat recovery systems from extractive air.
- Home automation systems or systems for the control and regulation of equipment or installations with the aim of saving energy, as well as systems for accounting, thelegalising and digitalising energy consumption.
- New installations of centralised district or district heating and cooling systems or serving several buildings, as well as the renovation and extension of existing ones.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets are as follows:

† **Taxation:** the Ministry of Finance will lead a thorough analysis on taxation in the residential sector in order to internalise the positive externalities of improving the energy efficiency of buildings relating to this sector. As a result of this work, Law 10/2022 on urgent measures to boost building renovation activity has been published in the context of the PRTR, which amends Law 35/2006 of 28 November on personal income tax (PIT), which approves:

- Deductions from personal income tax, applicable to sums invested in rehabilitation works,
- Aid granted under various programmes for the energy renovation of buildings in the PRTR shall not be included in the tax base for personal income tax, namely:

  1) Royal Decree 737/2020 (PREE) of 4 August. Aid programme for energy renovation actions in existing buildings.

  2) Royal Decree 477/2021 of 29 June 2009. Various incentive schemes linked to self-consumption and storage, with renewable energy sources, as well as the deployment of renewable energy thermal systems in the residential sector.

  3) Royal Decree 691/2021 (PREE 5.000) of 3 August. Aid programme for the energy renovation of existing buildings in municipalities facing demographic challenges.

  4) Royal Decree 853/2021, of 5 October, various aid programmes in the field of psychologicalrehabilitation and social housing.

† **Legislative measures:** the transposition into national legislation of the new requirements on energy efficiency and renewable energy, laid down by the new European Directives for new and existing buildings in the residential sector, will be a necessary condition for the success of the financing and support programmes that are envisaged to promote housing renovations.

From the publication of the previous NECP to this review, there have been very significant progress in planning and legislation:

- The Technical Building Code (CTE) has been amended several times in recent years: if Royal Decree 732/2019 of 20 December introduced requirements involving nominal reductions in non-renewable primaryenergy conthesis for multi-family (block) residential buildings of around 38 %, reaching up to 60 % in the most adverse winter areas, a new amendment to the CTE was published on 14 June 2022, the main new feature of which was the amendment of Section HE5 (Minimum generation of electricity from renewable sources) and the creation of a new paragraph HE6 concerning minimum allocations for electric vehicle charging infrastructure, which applies to newly constructed buildings and certain existing buildings.

- The revision of the Long-term Strategy for Energy Renovation in theBuilding Sec in Spain (ERESEE 2020) was published in June 2020, transposing Article 2a of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, as amended by Directive (EU) 2018/844, which states that each Member State shall develop a long-term strategy to support therenovation of its national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings. The ERESEE includes among its objectives for the renovation of housing those established by the PNIEC in the period 2021-2030.

- Royal Decree 736/2020, of 4 August, regulating the accounting of individual consumption in thermal building installations. The measure allows each building user to know and receive informationon their energy consumption in centralised heating or cooling and to pay only the amount they actually consume, thus promoting energy savings.

- Royal Decree 178/2021 of 23 March 2021 amending the 2007 Regulation on Thermal Buildings Facilities (RITE), bringing the regulation into line with European standards on eco-design and energy labelling (ErP and ELD).

- Royal Decree 390/2021 of 1 June 2015 approving the basic procedure for the certification of the energy performance of buildings, repealing the previous Royal Decree, and requiring the visit to the building or dwelling, which will make it possible to collect the data, tests and checks necessary for the correct completion of the energy performance certificate. In addition, the maximum validity period of the Energy Efficiency Certificate is reduced to 5 years when the energy rating is G, instead of 10 years for all other cases.

- Law 10/2022 on urgent measures to boost building renovation activity in the context of the PRTR, which amended Law 49/1960 on co-ownership, to facilitate decision-making to carry out works that contribute to improving the energy efficiency of the building, establishing a simple majority regime for the execution of such works, as well as for applying for aid and financing for their development.

- Transposition of Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, which includes new obligations for residential buildings. It must be transposed into national law within two years of its publication, in linewith the practice of all the above rules.

In the short term, studies should be launched to propose the amendment of Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency.

Finally, the legislative measures proposed by the Autonomous Communities in the context of their powersin housing or others will also be relevant.

□ **Public support**programmes: non-repayable aid and financing schemes for existing residential buildings that are renovated energy, improving energy rating. The programmes shall prioritise actions affecting a large number of buildings: non-refundable aid and financing programmes for existing residential buildings that are being refurbished to improve their energy performance, thereby improving energy ratings. Within these programmes, there are programmes (‘Renove Plans’) aimed at actions or interventions that do not affect the building as a whole but individual dwellings of private owners for the renovation of hollow enclosures (windows and joinery), decks and facades separately, boilers and heaters, among others.

In any case, public support shall be linked to a minimum leap in the energy rating or to aminimum of 30 % Aho rro in terms of primary energy, and the percentage of aid shall be increased if social criteria are met, to obtain high levels of energy rating or improvements of 2 or more letters, and to the implementation of comprehensive actions that act simultaneously on the building envelope and on the thermal installations of the building.

Until the revision of the NECP, non-repayable aid and financing schemes have been approved for existing residential buildings that are renovated energy, improving the energy rating.

The PRTR includes Component 2 “Implementation of the Spanish Urban Agenda: Urban rehabilitation and regeneration plan’,

the objective of which is the energy renovation of buildings, both residential and tertiary, with the energy objective of reducing the primary energy consumption of the building by at least 30 %.

This Component 2, out of the EUR 6.820 billion total budget, foresees a budget of EUR 4.000 billion for the energy renovation of housing in the period 2020-2023, through 6 reforms and 6 investments**. The**aid programmes dedicated in whole or in part to the energy renovation of residential or residential buildings are in the following investments:

- C02.I01: Rehabilitation programme for economic and social recovery in residential settings, with a budget of EUR 3.420 million.
- C02.I03: Energy Rehabilitation of Buildings Programme (PREE), with an increased budget of EUR 300 million to EUR 402 million.
- C02.I04: Regeneration and Demographic Challenge Programme (PREE5000 only), with EUR 50 million increased to EUR 200 million in budget.

The foundations of all these aid lines have been designed in coherence with the National EnergyStrategy 2019-2024 (see Measure 4.2 of this Plan) and the Just Transition Strategy, both approved in 2019. Interventions in households in energy poverty have higher aid intensities.

- Funding**programmes:** Creation of funding instruments, through partnership agreements with financial institutions, aimed at Communities of Owners, to promote the renovation of their buildings, as they may have difficulties in finding such funding on the ordinary channels.

  Component 2 "Implementation of the Spanish Urban Agenda: Urba regeneration and rehabilitationplan, including reform C02.R06: Improving the financing of renovation measures, which provides for the creation of an ICO guarantee line, to partially cover the risks of loans granted by private financial institutions for building renovation and housing activities promoted by the Ministry of Housing and Urban Agenda (MIVAU), which has already been authorised by the Government.

- **The Energy Savings Certificate System** (CAE, measure 2.23) will allow for the investment of subjects subject to the SNOEE in both replicable and individual energy renovations. However, the need to change the savings accounting framework to work with cumulative rather than annual savings is again underlined, so as to incentivise the real and full impact of investments, particularly when they are major investments with a long-term impact, as is the case here.

- **Training:** training of the actors involved in the energy renovation process (designers, optional management and external control of energy regulations) is essential for the smooth running of public support programmes. In addition, energy efficiency training should be strengthened within financial institutions, which are key players in stimulating new investment. These tasks have already begun to be carried out, through the development of tools such as IDAE's *online* training platform87, for training citizens on such important aspects as workplace energy savings, neighbourhood communities, household appliances, lighting, energy certification of buildings, which is considered essential for the smooth running of savings policies.

- **Information**: the establishment of rehabilitation offices will be encouraged. Guides and manuals on aspects related to energy renovation will also be developed and updated, and observatories, forums and working tables will be enhanced, maintaining a web platform for companies and stakeholders in the sector that includes good practices on energy renovation. A webpage is also88 created from 2022 onwards, providing information on the energy rating of certified buildings and the estimated energy rating of those not yet certified. Information is also provided as to where the energy performance certificate of the dwelling can be obtained in the relevant Autonomous Community and the existing ones in order to carry out an energy renovation of the dwelling. Guides have been drawn up on aspects related to energy renovation, such as the two practical guides for the management of aid for the energy renovation of buildings drawn up by the Spanish Council of Architects (CSCAE) in cooperation with IDAE, as well as the Technical Guide for the Accounting of Individual Heating Consumption in Heat Systems in Buildings (RD 736/2020) published by IDAE. Similarly, observatories such as Observatory 2030 of the CSCAE and the City Observatory have been enhanced.

- **Communication: specific information and communication campaigns**will be carried out, which may include campaigns aimed at setting up regional or local energy efficiency offices. Until 2022, specific information and communication campaigns have already been carried out in order to promote, among other things, energy renovation among citizens and sectoral actors, such as the social media campaign on 'energy saving councils' and the dissemination video entitled 'Energy Renovation of Housing', a key element in the energy transition promoted by IDAE, as well as the campaign of the Ministry of Housing and the Urban Agenda entitled 'Homelessness Hogar', disseminating the subsidy lines for the energy renovation of housing.

- The Council of Ministers on 11 October 2022 approved the **Plan More Energy Security (+ SE)** to strengthen the protection of citizens from the price hike caused by the war in Ukraine, as part of the European commitment to energy savings. One of the measures included in this Plan is to include additional information on bills to equip consumers with additional tools for decision-making on savings. Thus, the light and gas bills of consumers with less than 15 kW power and consumption below 50.000 kWh per year, respectively, will include a comparison of consumption with similar customers under the same postal code. They will also include tips on how to consume in a smart and efficient way.

g) Specific measures or individual actions on energy poverty

This measure will be implemented in coherence with the National Energy Poverty Strategy 20192024 (see Measure 4.2 of this Plan) and the Just Transition Strategy, both approved in 2019. Interventions in households in energy poverty will have higher aid intensities**.**

[38]

[39] The CAE system has set up factsheets to support the fight against energy poverty, known as CAE social. Consideration is also being given to the possibility of a multiplier of savings for such inventionsin energy efficiency.

www.aprendecomoahorrarenergia.es

httpendeavour//www.edificioseficientes.gob.es

h) Financial needs and public support

Total estimated public support for the development of this measure in the period 2021-2030 **amounts to EUR 4.187 billion,** largely coming from the European Structural Funds and the PRTR, which will make it possible to mobilise an investment volume of **EUR 32.453 billion over the whole period.** This will also be accompanied by other support lines such as the ICO Green line of the Plan.

i) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain the MIVAU,Mi nisterio de Hacienda and MITECO, together with the Autonomous Communities, in accordance with a co-management and co-financing model for energy efficiency measures and actions that respects Spain's distribution of competences.

MEASURE 2.9. RENEWAL OF RESIDENTIAL EQUIPMENT

a) Description

The objective of this measure is to reduce energy consumption by improving the energy efficiency of the pairof appliances or, more generally, of the stock of energy-consuming household equipment.

One of the most effective tools in the EU to promote energy efficiencyin energy intensive equipment is ecodesign and energy labelling rules, contributing around half of the 2020 energy savings target. In addition, ecodesign rules have comparedto addressing the most efficient and sustainable use of materials in product design and in the processes that take place throughout the value chain, involving: reduction of demand for material resources, improved energy efficiency, easy reuse and recycling, economy in maintenance, durability, reliability, safety, multi-functionality, emission reduction, etc.

During 2021, the process of rescaling energy labelling began, as a result of technological and innovation developments, which have allowed products to become more energy efficient and thus the need to rescale labels. As of 1 March 2021, energy labels have been rescaled for key consumer products such as light refrigerators, washing machines, televisions and light sources. However, around 40 % is still ongoing. Labels for heating and cooling appliances, water pumps, fans and external power supplies are currently under review.

Given that a significant part of the household energy equipment, and in particular the metical electrode park,is renewed at the end of its lifetime, it is considered an appropriate moment to encourage buyers to replace them with others with the best energy efficiency class among thoseplaced on the market.

The new and additional savings that will result from this measure (additions to those resulting from the application of Regulation (EU) 2024/1781 establishing a framework for setting ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC, and from Regulation (EU) 2017/1369 framework-for environmental labelling) will be those associated with bringing forward the decision to replace the equipment (in relation to the point in time at which the renewal would have taken place in accordance with the natural fleet renewal rates) and the fact that the measure will stimulate the purchase of equipment with higher energy yields than theaverage reduced energy in each of the years of this implementation period.

Priority shall be given to appliances with a higher energy consumption weight in the home, such as refrigerators, freezers and freezers, washing machines, dishwashers, ovens and kitchens.

With an estimated national fleet **of 76 million appliances** (refrigerators, freezers, washing machines, dishwashers andlighters), the measure aims to achieve savings as a result of the improvement in the energy class (with reference to energy labelling) compared to the reference class on the market at the time of replacement.

Considering that 6.6 million new white appliances are sold annually, the pro rata targetinvolves the penetration of 2.443.000

appliances/year of the highest energy efficiency class.

The aim is also to highlight the need for market surveillance and compliance of products, Regulation 2019/1020, in order to ensure compliance with the minimum ecodesign and energy labelling requirements and thus ensure the credibility of the system. Thus, in 2022, the General National Strategic Framework forthe Non-Food Market Gignance (MENVIME) was approved, a Sectoral Plan being the one on Energy Labelling Market Surveillance.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to achieve **1.745 ktoe of cumulative final energy savings** during theperiod 2021-2030**.**

c) Sectors addressed

This measure targets the domestic sector.

d) Eligible actions

The actions proposed in this Plan are mainly communication actions to promote the awarenessand use of the most efficient household appliances, knowledge of energy labelling and its importance as a decisive factor in the responsible and efficient purchase and use of equipment in the household. These communication actions will form part of an overall strategy that will be permanent in nature, targeting the City of Dianiaas the main player.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets shall be as follows:

- Energy**Saving Certificates (CAE) system** will allow SNOEE obligated parties to be invested as efficiently as possible in replicable actions for the purchase of residential energy consumption elements with a very demanding energy consumption label in the framework of the Energy Labelling Regulation.
- **Market surveillance. Sectoral Energy Labelling Market Surveillance**Plan, to be carried out in coordination with the Autonomous Communities, which are competent in this area**.**
- **Legislative measures: On**28 July 2017, the approval of Regulation (EU) 2017/1369 was published in the Official Journal of the European Union. At the same time, the European Commission and the Member States decide to revise the requirements for energy-labelled products and to rescale the energy classes so that there is a uniform A-G scale for all product groups. The new label was presented to consumers in physical and online shops on 1 March 2021 and for light sources on 1 September 2021. The new label therefore entails:

  • 1. A common A to G scale for all re-scaled products. The A + + +, A + + and A + categories will no longer be used. The new labels were implemented in physical and online shops for the following 7 product groups:

    1) Household refrigerators and freezers
    2) Wine storage refrigerators
    3) Washers
    4) Washer-dryers
    5) Dishwasher
    6) Televisions and electronic displays
    7) Light sources

For other product groups such as conditioned aires, dryers, stoves, boilers, etc.,the new etiques will be replaced once the new or revised EU regulations enter into force. Theintroduction of the label for those product groups is expected to take place from 2022.

• The label is linked to the European Product Registry for EU Energy Labelling (EPREL) through a QR code. This database provides additional information on all labelled products. All labelled products are currently inserted in this database by manufacturers and distributors. The database provides additional information on products that are not included on the label. This information is accessible to consumers, professional buyers and other stakeholders.

In the first months of the introduction of the new label, few "A" class ducts are expectedto be available on the market. This aims to keep space for more innovative and efficient products that will develop in the future.

The energy efficiency of products does not change, but the rescaling of the energy classification may cause the letter of their label to vary, although there is no correlation between new and old labels as testing methods have changed to calculate the new label.

- **Voluntary agreements**: these will be signed with associations of manufacturers, distributors and retailers of household appliances in order to coordinate campaigns and actions to provide consumers with information and training for salespeople.

- **Training**: activities related to this measure will be designed and carried out. These may include – as an example and by no means limited to – courses on energy efficiency in household appliances, which will target both household appliance vendors and the general public, organised in collaboration with associations of manufacturers, retailers and consumers, and offered either in person or online.

- **Information**: updated information on energy labelling will be made available on the IDAE website in order to disseminate information among users about the most energy-efficient appliances and systems.

- **Communication**: in line with the Plan's overall communication strategy, based primarily on information, training and targeted dissemination through the digital ecosystem (own and won social networks, blogs, expert and sectoral forums), with the support of targeted advertising, it is proposed that a specific line of action be put in place to help boost the **purchase of more efficient appliances**, with energy savings and environmental commitment being particularly valued in communication.

  This communication line will be developed continuously over time, intensifying in line with peak purchasing periods and in coordination with associations of manufacturers, distributors and traders, enabling IDAE to activate its own communication initiatives.

  In addition, communication actions will be developed focusing on **the efficient and responsible use of equipment.**

  In order to disseminate and explain the changes involved in Regulation (EU) 2017/1369, a communication campaign was designed and implemented in cooperation with ECODES, the messages of which can be seen in this[89]video, as wellas the specific[90] section of the IDAE website dedicated to this sector.

  In addition, specific information and communication campaigns have been carried out in order to promote, inter alia, the efficient use of household appliances among citizens, such as those already mentioned in Me dida2.8 (the social media campaign on 'Energy Savings Councils' and the 'Energy Renovation of Housing, a key part of the energy transition promoted by IDAE'[91]).

- **Public aid programmes**: In 2024, renove plans for household appliances have been activated in several Autonomous Communities to promote better energy labelling equipment.

89 Video New Energy Label
90IDAE – Energy Save – Energy Labelling, Ecodesign and Ecolabel – European Energy Labelling Framework Regulation UE/2017/1369
91Sweethome

f) Financial needs and public support

Public financial support will be allocated to communication and coordination and support campaigns in the implementation of the Energy Labelling Sector Surveillance Plan for Energy Labelling, in the General National Strategy for Market Surveillance of Non-Food Products (MENVIME). These actions can be considered within the framework of the SNOEE. For their part, the Autonomous Communities shall allocate the corresponding effort to the exercise of their competence in the field of market surveillance.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be MITECO, together with the Autonomous Communities, in accordance with a model of co-management and co-financing of measures and actions inthe field of energy efficiency that respects the distribution of competences in Spain.

Public administrations will work together to implement this measure with associations of submitters andusers, which will have to play an active role through the conclusion of voluntary agreements.

MEASURE 2.10. DISTRICT HEATING AND COOLING NETWORKS IN THE RESIDENTIAL SECTOR

(a) Description

This measure aims to facilitate the penetration of **renewable or waste energy sources, which are efficient and flexible** in the air-conditioning of residential buildings and in other industrial heat and cold applications in the same arearange. It will also be accompanied by the promotion of centralisation of individual installations by means of other technical solutions available on the current market because of their simplicity of implementation and depending on theidonity of the technical solution in each case.

The revision of the Renewable Energy Directive requires Member States to take the necessary measures to increase the share of renewable energy in heating and cooling consumption by 1.1 % per year from the value achieved in 2020. Moreover, the share of heating and cooling networks using renewable energyin the heating and cooling supply is well below the 2 % referred to in Article 24 (10) (a) of Directive 2018/2001 on the promotion of the use of energy from renewable sources, with some 361 MW installed at the end of 2 021 in the residential sector. In view of the above, itis advisable to establish foot measures for district heating and cooling networks using renewable energy.

A significant potential for newly established heating and cooling networks in Spain has been identified. Therefore, this Plan considers specific measures, both regulatory and financial support, to ensure that heating and cooling networks using renewable energy sources have a more significant share in 2030.

In this regard, according to Article 25 of the new Energy Efficiency Directive (EU) 2023/1791 on the assessment and planning of heating and cooling networks and its Annex X, local heating and cooling plans will be carried out in municipalities with more than 45.000 inhabitants, which in Spain account for a total of 164.

For the time being, this technology has a strong testimonial presence in Spain. According to the latest available Eurostat data for the year 2021, heat production with these systems is 428 GWh (189 GWh for cold applications), which contrasts with data from neighbouring countries such as Italy (13.070 GWh) or France (33.763 GWh). This technology should therefore be considered with ambition, noting the following points:

- Heating and cooling networks, although they are a cost-effective solution in the long term, require significant **investment** and, although heating needs, measured in degrees of days, can be around half of the other in northern Europe, urban population density is in the order of double in many Spanish cities. In addition, there is a growing need for cooling in the air-conditioning of residential buildings.
- Furthermore, it will be necessary to analyse the **technical challenges** involved in introducing heating networks in Spain. Firstly,

heating and cooling networks are not only an option for new urban developments, where initial planning and construction are simpler and more economical, but also for areas already built, where population density is often higher, and where current heating systems are often individual boilers. It is therefore necessary to consider how to best resolve the necessary interconnection between the potential heating and cooling network and existing residential buildings that often **lack easily connectable infrastructure**92. On the other hand, the introduction **of cooling for residential buildings** from these networks is still an infrequent practice, even in the rest of Europe. It is necessary to study and analyse how to manage, both from a production point of view, using, for example, geothermal energy with large heat pumps, and in the urban distribution and connection to existing neighbourhood buildings mentioned above.

On the other hand, it is also important to stress that, in supplying energy to heating and cooling networks, systems haveso many advantages that they make air-conditioning by networks the best option, including:

► **Heat pumps and chillers**

- They have many alternatives to **avoid heat islands**, and **are not affected by the extraction** of neighbouring **heat pumps (smoothin summer, cold in winter, reduced efficiency in both cases)**.
- They **make it easier to use the heat of water** (sea or other water accumulation) **and subsoil** (artificial infrastructure or geological reservoirs on both sides of the groundwater level)
- They are more easily controllable, often better maintained and less obsolescence (both leading to **better efficiency and lower energy consumption**)
- They have no or almost no sound and visual impact.
- Combined with thermal storage technologies, they can offer **flexibility** and demand management services to the electricity system.

—Biomass**, Biogas, Solar Thermal Energy**

- Biomass, biogas or solar thermal energy have both the option of integrating into district heating and of producing cold with absorption cycles, contributing flexibly, clean and efficient to meet **the thermal and refrigerationneeds of large urban areas**.
- The integration of large boilers with new biofuels offers the best operating and maintenance conditions, resulting in **much better seasonal yields and lower gene consumption(** fewer starches and stops, intelligent system control, and support for thermal inertia systems). In this regard, measure 22 of the Biogas Roadmap encourages heat networks powered by biogas (distributed generation).

-Electric boilers

- Electric boilers find their best ally in the heating and cooling networks, as despite being a much less efficient form of heat production than the heat pump, their low cost can make them ideal to provide flexibility to the electricity system. These boilers can thus support the production of heat both for heating and DHW and for thermal storage (and even as support for absorption cold production technologies).

In general terms, the collective supply of heating and cooling is more flexible, more efficient, and hasmore intelligent control capabilities. Therefore, and in accordance with Article 25 of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), promotion and incentive policies

92 This lack of proper connection between dwellings should not be an unaffordable problem, given the relatively similar previous experiences, such as the numerous campaigns to provide lifts to buildings that did not have them and which involved their installation in thousands of Spanish buildings.

should promotethe following schemes:

- Collective heat and cold supply with flexible systems, as clean and efficient as possible.
- If this is not feasible, partial nets or micro-nets; combined with separate collective systems per building, and only as a last option separate supply for each apartment.

Finally, it should be noted that heating and cooling networks will enable the highest and most efficient contribution of renewable energy to the air-conditioning of urban buildings in Spain. It should be noted as a reference that the currentrenewable contribu of heat networks in countries where this technology is common and modernised with 4th and 5th generation networks is already 60 % in Denmark, 82 % in Sweden, 70 % in Lithuania or 56 % in France[93].

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The expected savings are computed as the contribution of energy from solar radiation, geothermal, hydrothermal or aerothermal sources, or other renewable or residual sources.

This measure is expected to achieve cumulative estimated savings of **599,0** ktoe over the period 2021-2030. However, CO2 emission savings are much$_{more}$ significant when replacing fossil fuels with renewables.

In addition to these savings, the ability to integrate the contribution from residual heat (such as those generated by urban infrastructure or industrial processes, among others), the use of biomass or waste (through methanisation or the most environmentally appropriate alternative), and the renova fractionof electricity that power large heat pumps or other equipment to feed the grid should be reemphasised.

In addition, the IDAE published a heat map in 2022,[94] which is a tool of extraordinaryuse to start studying in more detail the technical and economic potential of each area. However, at present and in the absence of such studies, it is difficult to estimate the potential accurately.

If the energy consumption of residential buildings in Spain reaches almost 14 % of final energy consumption and assuming a scenario in which between 25 % and 50 % of long-term demand (horizon 2050) is addedto heat and cold networks; and taking into account, according to the new Directive (EU) 2023/1791 on energy efficiency, a clean energy supply to such networks, savings of between 3 % and 7 % of national final energy consumption can be estimated.

c) Sectors addressed

These measures are aimed at all buildings in the residential sector with air-conditioning needs and in areas of high population density, and also at heating and cooling needs in the industrial sector that are closeto the same temperature range as air conditioning.

d) Eligible actions

Eligible actions will be those that facilitate the deployment of district heating and cooling networks, such as:

- R & D & I projects in the development of 100 % more efficient heating and cooling networks with renewable energy sources.
- Feasibility studies for the deployment of renewable heat and cold networks.
- Project, deployment and implementation of renewable heat and cold networks.

93 JRC, Integrating renewable and waste heat and cold sources into district heating and cooling systems, 2021
94Heat map of Spain

e) Policy mechanisms

The policy mechanisms that will make progress on this measure possible shall be the achievement of the following:

- **Legislative measures**: The relevant ministerial departments (MITECO, MIVAU) will address the following issues, both to update existing plans (ERESEE) and to produce new regulation or regulatory changes in the following areas:
  - General regulation of heating and cooling networks in order to reduce administrative burdens, standardise requirements at national level and facilitate investments. Amendment, where appropriate, of the Technical Code for edification and the Regulation on Thermal Infrastructure in Buildings
  - Obligation of prior feasibility studies and development of obligations for the implementation of municipal plans for clean and efficient energy supply to buildings that consider, among other things, the options for cooland cold networks, in accordance with Article 25 of the new Energy Efficiency Directive (EU) 2023/1791 for municipalities with more than 45.000 inhabitants.
  - Declaration of public benefit of land occupation for the installation of cold and heat production plants, storage, and the right to impose a compulsory right of passage of pipes, both on public and private land. Grant, where appropriate, of public concessions for the construction of heating and cooling networks.
  - Obligation for urban development plans to provide for and allow for the location of infrastructure in the subsoil of public roads, free spaces or green areas. System of corresponding permissions administrative.
  - Investment plan forecasts.
  - Amendment of Mining Act 22/1973 (currently under revision) to promote research,exploration and exploitation of geothermal resources, where, for example, the mininggrid could be modified for such activities.
  - Setting design and safety conditions for infrastructure.
  - Development and use of standards to support the above-mentioned policy mechanisms and public procurement, so as to facilitate their effective deployment and implementation.
- **Public aid programmes: non-repayable and financing**schemes for high-efficiency heating and cooling networks (as defined in the new Energy Efficiency Directive). In 2022, the first call for Incentives Programmes for heat and cold network projects using renewable energy sources was launched, both for companies and natural persons engaged in economic activity and for persons not engaged in economic activity.
- **Information and communication**:
  - Mechanisms to improve the information available to fulfil statistical obligations on existing and new heat and cold networks, which shall include at least installed capacity, technology used, fuel used, energy produced and whether the installation meets the definition of ‘efficient district heating and cooling’ in the Energy Efficiency Directive (which by 31 December 2 027 marks at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of these types of energy and heat as referred to in Article 26).
  - Information channel for final consumers on the energy efficiency and share of renewable energyin the heat networks to which they are connected. This measure may be carried out bymodifying the regulations on existing thermal installations (RITE) and the energy certification of buildings.
  - Increased information in the heat map to help identify new heating and/or cooling networks in Spain.
  - Development of renewable energy communities linked to air-conditioning and cooling networks, including technical training at municipal level.

- Establishment and continuation of forums for discussion and support for the promotion of heating and/or cooling networks.

f) Financial needs and public support

Public financial support for the development of this measure in the period 2021-2030 will be allocatedto both non-repayable submissions and investments in new projects. They will also be covered by the CAE scheme.

g) Responsible

The technical and economic construction and management of heat networks is usually carried out at municipal level, either from public, private, mixed organisations or through energy communities. In any event, both theobjective of management and the need to promote these technologies require action by the General State Administration.

Thus, the public authorities responsible for implementing and monitoring the current promotion measures will be MITECO, together with the Autonomous Communities, in accordance with a co-management and co-financing model for energy efficiency measures and actions that respect Spain's distribution of competences.

Public administrations will work together to implement this measure with municipalities and economic and social stakeholders, especially consumer and user associations, which can play an active role through the conclusion of voluntary agreements.

In addition, MITECO will explore the establishment of a common framework to promote decarbonisedand cost-efficient energy supply by considering the operation of distribution networks, the dispatching system for me to nimifythe cost and environmental impact of the contribution of different energy sources to the grids, the permits and rights for connection to a grid, access to third parties to connect productive elements to the networks, etc.

For its part, the MIVAU is already taking into account for the preparation of the National Building Renovation Plan (PNRE), which will replace the ERESEE, heating and cooling networks (measure 7: Promotion of heating and cooling networks), which may also require legislative developments related to urban planning, declaration of public interest and other matters within its remit.

Tertiary sector

MEASURE 2.11. ENERGY EFFICIENCY IN BUILDINGS IN THE TERTIARY SECTOR.

a) Description

The measure aims to reduce the energy consumption of existing buildings used in the tertiary sector, whether they are publicly or privately owned, by means of energy renovation actions to improve their energy rating.

As set out in Measure 2.8 of this Plan, which concerns the improvement of the energy efficiency of existing buildings in the residential sector, energy efficiency certification (Royal Decree 390/2021 of 1 June) is a very valuable tool for promoters of renovation actions when carrying out new invsionsinto existing buildings.

The measure comprises different mechanisms:

- Revision of energy efficiency requirements in tertiary buildings, which include new energy efficiency obligations or revisions of existing ones established by standard. This point highlights the minimum energy performance standards for non-residential buildings to be established in accordance with Article 9 of Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, ensuring that such buildings do not exceed the maximum energy performance threshold to be specified in compliance with that Directive.
- Extension of the obligation to renovate public buildings of the General State Administration to the Regional and Local Administration (set out in Article 6 of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September on energy efficiency and amending Regulation (EU) 2023/955). Extending the mandate to all regional and local administrations would ensure that the proactive and responsible role of the public sector is fulfilled and would result in savings in the energy bills of public administrations.
- Energy renovation of buildings through public support and funding programmes. The aid programmes of Component 2 of the PRTR, such as the Support Programme for Energy Renovation Actions in Existing Buildings (PREE), the Energy Rehabilitation Programme for existing buildings in municipalities facing demographic challenges (PREE 5000 Programme) or the Programme for the Promotion of Public Buildings (PIREP), are the reference for this type of public support for the renovation of buildings in the tertiary sector.
- Energy saving and efficiency plans, such as the Plan of measures for energy saving and efficiency in the General State Administration, approved on 22 May 2022.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims at achieving 3.361ktoe **of cumulative final energy savings** during theperiod 2021-2030.

These savings should be revised in line with the new National Building Renovation Plan and the rest of the transposition of Directive (EU) 2024/1275.

c) Sectors addressed

This measure is aimed at existing tertiary, publicly owned and privately owned buildings. Aid schemes shall benefit owners or owners of existing buildings, whether natural or legal persons. Where the beneficiaries of the aid are legal persons of a private nature, the programmes shall comply with State aid rules.

d) Eligible actions

The eligible actions in the renovation of buildings will be those that achieve a reduction in CO_2 emissions and final energy consumption, by improving those services with a greater weight on the energy consumption of buildings, such as heating, cooling and domestic hot water production:

- **Thermal envelope:** action will be taken on the thermal envelope of the building to achieve a reduction in the heating and cooling demand of the building. Energy efficiency actions may include, inter alia, façades, roofs, floors, external carpentry, glass and sunscreens.
- **Thermal installations:** action will be taken on thermal heating, air-conditioning, domestic hot water production and ventilation, which are regulated by RITE. The measure provides for the incorporation of renewable energy sources to cover demand in accordance with the final renewable energy consumption targets considered in this Plan.
- **Lighting installations:** action shall be taken on the interior lighting systems of buildings, bringing them into line with the required energy performance values according to the use of each area; setting up systems for regulating and controlling lighting according to activity in each building area, and adapting the level of lighting according to the supply of natural light.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets are as follows:

† **Taxation**: Law 10/2022 on urgent measures to boost building renovation activity in the context of the PRTR, amending Law 35/2006 of 28 November on personal income tax (PIT), has been published, which approves:

- Deductions from personal income tax, applicable to sums invested in rehabilitation works.
- Aid granted under various programmes for the energy renovation of buildings in the PRTR shall not be included in the tax base for personal income tax, namely:

1) Royal Decree 737/2020 (PREE) of 4 August. Aid programme for energy renovation actions in existing buildings.
2) Royal Decree 477/2021 of 29 June 2009. Various incentive schemes linked to self-consumption and storage, with renewable energy sources, as well as the introduction of renewable energy systems in the residential sector.
3) Royal Decree 691/2021 (PREE 5.000) of 3 August. Aid programme for the energy renovation of existing buildings in municipalities facing demographic challenges.
4) Royal Decree 853/2021, of 5 October, various aid programmes in the field of psychologicalrehabilitation and social housing.

- **Legislative measures**: extension of the mandate stemming from Article 6 of the Energy Efficiency Directive under the Fit for 55 to all public administrations and new rules, such as Royal Decree-Law 14/2022 and Royal Decree 450/2022 of 14 June amending the Technical Building Code, approved by Royal Decree 314/2006 of 17 March.
- In addition to the legislative measures already mentioned in Measure 2.6, specific measures have been adopted to support energy efficiency actions in the tertiary sector:

- The Council of Ministers of 24 May 2022 approved a Plan of Energy Savings and EfficiencyMeasures, addressed to the General State Administration and state public sector entities. This plan, promotedby the Ministries of Ecological Transition and the Demographic Challenge (MITECO), and the Ministry of Finance and the Civil Service, has as its main objectives the rationalisation of the use of buildings and administrative facilities, as well as the establishment of ways of organising the work of public employees that will result in such energy savings, while ensuring the full delivery of services and attention to citizens. The plan of energy saving measures is one of the commitments set out in the National Plan forImaging the Economic and Social Consequences of the War in Ukraine, approved by the Council of Ministers on 29 March. This war has raised the price of fuels in Europe to historical levels and highlighted the risks of high energy dependence.

- Transposition of Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings, which includes new obligations for non-residential buildings, including minimum energy performance standards, requirements for technical building systems, solar energy or infrastructure for sustainable mobility. It must be transposed into national law within two years of the publication of the directive.

□ **Public support**programmes: non-repayable aid and financing programmes for buildings in the tertiary sector that are rehabilitated in energy, improving the energy rating. In this area, within the framework of the PRTR and specifically Component 2 'Implementation of the Spanish Urban Agenda: Urban rehabilitation and regeneration plan', specific programmes have already been developed in the tertiary sector, with the energy objective of reducing the building's non-renewable primary energy consumption by at least 30 %. The aid programmes partially dedicated to the energy renovation of tertiary buildings, with an estimated budget of EUR 1.150 million, are:

- C02.I01: Rehabilitation programme for economic and social recovery in residential environments, with a budget of EUR 3.420 million, including 2 programmes whose budget is mainly devoted to the energyrenovation of buildings in the tertiary sector owned by the local and regional authorities:

  A) Local PIREP support programme with EUR 600 million.

  B) PIREP Autonomous Community programme with EUR 480 million.

- C02.I03: Energy Rehabilitation of Buildings Programme (PREE), with an increased budget of EUR 300 million to EUR 402 million.

- C02.I04: Regeneration programme and demographic challenge (PREE 5000), with EUR 50 million extended to EUR 200 million.

- C02.I04: Regeneration and Demographic Challenge Programme (DUS 5000), with EUR 75 million extended to EUR 675 million. It is estimated that 10 % of this budget (EUR 68 million) will be earmarked for the energy renovation of locally owned tertiary buildings.

In addition, the PRTR in its Component 11 'Modernisation of Public Administrations' includes an investment programme C11.I4 'Energy Transition Plan in the General State Administration', with a budget of EUR 1 070.7 million, of which EUR 664.5 million is dedicated to the energy renovation of buildings owned by the central government.

Furthermore, the PRTR in Component 14 'Plan for the modernisation and competitiveness of the tourism sector' with a budget of EUR 3.400 million includes a sub-measure 2 entitled 'Financing energy efficiency and circular economy projects (reduction, reuse and recycling of waste) in tourism enterprises' with EUR 220 million, of which EUR 170 million has already been called for, distributed among the Autonomous Communities by agreement of the Sectoral Conference on Tourism of 29 March 2022.

It can therefore be concluded that the PRTR aid for the energy renovation of buildings in the tertiary sector amounts to EUR 2.000 million.

► **A system of Energy Saving Certificates** (CAE) will make it possible to invest in the most efficient way possible for those subject to the SNOEE in actions, both replicable and singular, related to energy efficiency in this sector.

► **Training**: training of the actors involved in the energy renovation process (designers, optional management, agents responsible for external control of energy legislation, as well as energy managers and managers of public buildings) is essential for the smooth running of public support programmes. In addition, energy efficiency training should be strengthened within financial institutions, which are key players in stimulating new investment. Tools such as IDAE's *online* training platform95 for the training of energy managers in public buildings have been developed, which is considered essential for the smooth running of public

95 www.aprendecomoahorrarenergia.es

support programmes and specific plans designed for public administrations.

- **Information**: guides and manuals on aspects related to energy efficiency improvements will be prepared and updated. The observatories, forums and working tables will also be enhanced. A webpage is also[96] created from 2022 to provide information on the energy rating of certified buildings and the estimated energy rating of those not yet certified. Information is also provided on where and how the building's energy performance certificate can be obtained in the relevant Autonomous Community and the existing aid to carry out energy renovation of the building.
- **Communication**: specific information and communication campaigns will be carried out. Specifically, an information and communication campaign has already been drawn up for public administration buildings, including messages on energy saving, renewable energy use and sustainable mobility, with a view to their dissemination and use in all public administrations.

f) Financial needs and public support

The total estimated public financial support for the development of this measure in the period 2021-2030 amounts to EUR 2.376 **billion**, which will largely come from European structural and investment funds forthe new financial framework**, mobilising around EUR 4.420 billion in investment.**

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be MITECO, together with the Autonomous Communities and Local Authorities, in accordance with a model of co-management and co-financing of energy efficiency measures and actions that respects Spain's distribution of competences.

MEASURE 2.12. DISTRICT HEATING AND COOLING NETWORKS IN THE TERTIARY SECTOR

a) Description

This measure aims to facilitate the penetration of **renewable or residual, efficient and flexible sources of energy** into CLI qualification of tertiary buildings and other industrial heat and cold applications in the same temperature range.

The revision of the Renewable Energy Directive requires Member States to take the necessary measures to increase the share of renewable energy in heating and cooling consumption by 1.1 % per year from the value achieved in 2020. Furthermore, the share of heating and cooling networks using renewable energyin the heating and cooling supply is well below the 2 % referred to in Article 24 (10) (a) of Directive 2018/2001 on the promotion of the use of energy from renewable sources, with some 442 MW installed at the end of 2 021 in the tertiary sector. This makes it advisable to introduce measures to promote district heating and cooling networks using renewable energy.

A significant potential for newly established heating and cooling networks in Spain has been identified. Therefore, this Plan considers specific measures, both regulatory and financial support, to ensure that heating and cooling networks using renewable energy sources have a more significant share in 2030.

In this regard, according to Article 25 of the new Energy Efficiency Directive (EU) 2023/1791 on the assessment and planning of heating and cooling networks and its Annex X, local heating and cooling plans will be carried out in municipalities with more than 45.000 inhabitants, which in Spain account for a total of 164.

For the time being, this technology has a strong testimonial presence in Spain. According to the latest available Eurostat data for the year 2021, heat production with these systems is 428 GWh (189 GWh for cold applications), which contrasts with data from neighbouring countries such as Italy (13.070 GWh) or France (33.763 GWh). This technology should therefore be considered with

96 vehicles.gob.es

ambition, noting the following points:

- Heating and cooling networks, although a cost-effective solution in the long term, require significant **investment**. In addition, there is a growing need for cooling in the air-conditioning of tertiary buildings, as is the case in residential buildings.
- Furthermore, it will be necessary to analyse the **technical challenges** involved in introducing heating networks in Spain. Firstly, heating and cooling networks are not only an option for new urban developments, where initial planning and construction are simpler and more economical, but also for areas already built, where the current heating systems are often individual boilers. It is therefore necessary to consider how to best resolve the necessary interconnection between the potential heating and cooling network and existing tertiary buildings that often **lack easily connectable infrastructure**. On the other hand, as in residential buildings, the introduction of **cooling for tertiary buildings** from these networks is still an infrequent practice, even in the rest of Europe. It is necessary to study and analyse how to manage, both from a production point of view, using, for example, geothermal energy with large heat pumps, and in the urban distribution and connection to existing neighbourhood buildings mentioned above.
- Finally, it should be noted that heating and cooling networks will enable the highest and most efficient contribution of renewable energy to the air-conditioning of tertiary buildings in Spain. It should be noted as a benchmark that the current renewable contribution of heat networks in countries where this technology is common and modernised with 4th and 5th generation networks is already 60 % in Denmark, 82 % in Sweden, 70 % in Lithuania or 56 % in France[97].

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The expected savings are computed as the contribution of energy from solar radiation, geothermal, hydrothermal or aerothermal sources, or other renewable or residual sources.

This measure is expected to achieve cumulative estimated savings of **399,8** ktoe over the period 2021-2030. However, CO2 emission savings are much$_{more}$ significant when replacing fossil fuels with renewables.

In addition to these savings, the ability to integrate the contribution from residual heat (such as those generated by urban infrastructure or industrial processes, among others), the use of biomass or waste (through methanisation or the most environmentally appropriate alternative), and the renova fractionof the electrical fraction driving large heat pumps or other equipment to feed the grid should be reemphasised.

In addition, the IDAE published a heat map in 2022,[98] which is a tool of extraordinaryuse to start studying in more detail the technical and economic potential of each area. However, at present and in the absence of such studies, it is difficult to estimate the potential accurately.

If the energy consumption of tertiary buildings in Spain reaches almost 17 % of final energy consumption andassuming a scenario where between 25 % and 50 % of long-term demand (horizon 2050) would be supplied with heating and cooling networks; and taking into account, according to the new Energy Science Directive (EU) 2023/1791, a cleanenergy supply to such networks, savings of between 4 % and 8 % of national final energy consumption can be estimated.

c) Sectors addressed

These measures are aimed at all buildings in the tertiary sector that are inhabitable in areas with higher climate needsand in areas of high population density, and also at heating and cooling needs in the industrial sector that are in approximately the same temperature range as air conditioning.

d) Eligible actions

97 JRC. Integrating renewable and waste heat and cold sources into district heating and cooling systems. 2021
98Heat map of Spain

Eligible actions will be those that facilitate the deployment of district heating and cooling networks, such as:

- R & D & I projects in the development of 100 % more efficient heating and cooling networks with renewable energy sources.
- Feasibility studies for the deployment of renewable heat and cold networks.
- Project, deployment and implementation of renewable heat and cold networks.

e) Policy mechanisms

The policy mechanisms that will make progress on this measure possible shall be the achievement of the following:

† **Legislative measures**: The relevant ministerial departments (MITECO, MIVAU) will address the following issues, both to update existing plans (ERESEE) and to produce new regulation or regulatory changes in the following areas:

- General regulation of heating and cooling networks in order to reduce administrative burdens, standardise requirements at national level and facilitate investments. Amendment, where appropriate, of the Technical Code for edification and the Regulation on Thermal Infrastructure in Buildings
- Obligation of prior feasibility studies and development of obligations to implement municipal plans for clean and efficient energy supply to buildings that consider, inter alia, heat and cold network options, in line with Article 25 of the new Directive (EU) 2023/1791 onGenetic Efficiency. As stated above, these plans will be mandatory for municipalities with more than 45.000 inhabitants.
- Declaration of public benefit of land occupation for the installation of cold and heat production plants, storage, and the right to impose a compulsory right of passage of pipes, both on public and private land. Grant, where appropriate, of public concessions for the construction of heating and cooling networks.
- Obligation for urban development plans to provide for and allow for the location of infrastructure in the subsoil of public roads, free spaces or green areas. System of corresponding permissions administrative.
- Investment plan forecasts.
- Amendment of Mining Act 22/1973 (currently under revision) to promote research,exploration and exploitation of geothermal resources, where, for example, the mininggrid could be modified for such activities.
- Setting design and safety conditions for infrastructure.
- Development and use of standards to support the above-mentioned policy mechanisms and public procurement, so as to facilitate their effective deployment and implementation.

- **Public aid programmes: non-repayable aid and funding**programmes for high-efficiency heating and cooling networks (in line with the definitions under consideration for the new energy efficiency directive). The first call for Incentives Programmes for heat and cold network projects using renewable energy sources was launched in 2022.
- Information and communication:
  - Mechanisms to improve the information available to fulfil statistical obligations on existing and new heat and cold networks, which shall include at least installed capacity, technology used, fuel used, energy produced and whether the installation meets the definition of ‘efficient district heating and cooling’ in the Energy Efficiency Directive (which by 31 December 2 027 marks at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of these types of energy and heat as referred to in Article 26).
  - Information channel for final consumers on the energy efficiency and share of renewable energyin the heat networks to which they are connected. This measure may be carried out bymodifying the regulations on existing thermal installations (RITE)

and the energy certification of buildings.

- Increased information in the heat map to help identify new heating and/or cooling networks in Spain.
- Development of renewable energy communities linked to air-conditioning and cooling networks, including technical training at municipal level.
- Establishment and continuation of forums for discussion and support for the promotion of heating and/or cooling networks.

f) Financial needs and public support

Public financial support for the development of this measure in the period 2021-2030 will be allocatedto both non-repayable submissions and investments in new projects.

They will also be covered by the CAE scheme.

g) Responsible

The technical and economic construction and management of heat networks is usually carried out at municipal level, either from public, private, mixed organisations or through energy communities. In any event, both theobjective of management and the need to promote these technologies require action by the General State Administration.

Thus, the public authorities responsible for the implementation and monitoring of the current promotion measures will be MITECO, together with the Autonomous Communities, in accordance with a model of co-management and co-financing of energy efficiency measures and actions that respects Spain’s distribution of competences.

The public administrations will work together to implement this measure with the municipalities and with the economicand social age groups, which can play an active role through the conclusion of voluntary agreements.

In addition, MITECO will explore the establishment of a common framework to promote the wastefuland cost-efficient supply of energy, taking into account the operation of distribution networks, the dispatching system to minimise the cost and environmental impact of the contribution of the different energy sources to the grids, the lossand rights of connection to a grid, access to third parties to interconnect productive elements to the systems, etc.

For its part, the MIVAU is already taking into account for the drafting of the PNRE, which will replace the ERESEE, the heating and cooling networks (measure 7: Promotion of heating and cooling networks), which may also require legislative developments related to urban planning, declaration of public interest and other matters within its remit.

MEASURE 2.13. ENERGY EFFICIENCY IN COLD GENERATING EQUIPMENT AND LARGE AIR-CONDITIONING OF THE TERTIARY SECTOR AND PUBLIC INFRASTRUCTURE

a) Description

The measure aims to reduce electricity consumption in the tertiary sector and can be subdivided into two:

- Measures for the renovation of major heating and cooling installations, the renovation of cooling equipment and storage and freezing units.
- Energy efficiency improvement measures in publicly owned infrastructure, mainly in public lighting installations, both outdoor and urban indoor and underground infrastructure, and in installations in the integral water cycle: poisoning, supply, purification, reuse and desalination of water, among others.

The first is aimed at reducing consumption in cold facilities for the storage and preservation of perishable products in refrigerating houses and in logistics facilities for supplies to cities, in large air-conditioning facilities for buildings in the tertiary sector (airports, hospitals, food centres, offices, etc.), as well as in small installations, furniture and cabinets, food shops, shops and retail premises. In addition, the combination of these facilities with inertial thermal storage and an appropriate control strategy allows for other benefits related to increased flexibility of the energy system.

In the area of commercial refrigeration, a deviation from consumption of the order of 10 % in the refrigeration neededfor the food distribution is equivalent to the total energy consumption of more than 68.000 households. This gives an idea of the importance of proper market surveillance to protect consumers and ensure ethical competition from products and manufacturers, **but also to trust that the expected savings will be achieved by purchasing allegedly more efficient equipment**.

Deviations	**5 %**	**10 %**	**15 %**
in GWh	**340**	**681**	**1.021**

Thus, in 2022, the National Market Surveillance Strategy was approved and, within it, the Sector Plan for Energy QuiledEti was approved in accordance with Regulation (EC) No 1020/2019 on Market Surveillance. During the marketsurveillance scheme, which is a competence of the Autonomous Communities in Spain, it is checked that the product is in the European database EPREL and that what has been declared, concerning the characteristics and specifications of the product, is true and tagged.

The second aims to bring the lighting of Spanish municipalities into line with Royal Decree 1890/2008 of 14 November 2015, which approved the Regulation on energy efficiency in outdoor lighting installations, regulating the maximum levels of lighting according to the activity carried out in the various spaces and the incidence of lighting towards others, as well as increasing the minimum levels of energy efficiency for light points.

In addition, the objective is to improve the energy efficiency of water drainage, drainageand purification facilities by reforming existing installations and by introducing efficiency and low energy consumption criteria in the specifications of the calls for tenders relating to poisoning projects.

This second policy measure includes the energy efficiency strategy of the State Road Network approved by MITRAMS, which aims to save 50 % of its energy consumption by changing lighting from its road infrastructure to a more efficient one and introducing renewable energies.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to **achieve a cumulative final energy saving of 4.388,7 ktoe** in the period 2021 – 2030.

c) Sectors addressed

The measure is aimed at the tertiary sector, either natural or legal persons with large refrigerationfacilities (over 70 kWe) or air-conditioning installations and those who own small installations, using furniture and cabinets, in grocery shops, shops and commercial areas. In any case, refrigeration and air-conditioning installations must be assessed and renovated comprehensively as part of an improvement in the efficiency of the building that contributes to a reduction in the necessary thermal input. As regards public infrastructure, the measure is aimed at local authorities and the concessionaires of the management of municipal public services.

d) Eligible actions

Eligible actions will be those that achieve a reduction in CO_2 emissions and final energy consumption by improving energy efficiency in:

-Sub-measure **1.** Cold generation equipment.

Cold generating equipment that improves energy efficiency by incorporating reguand control systems, recovering heat from condensation or evaporation and others with high capacity in Aho rroof energy (multi-stage or ability to change condensation or evaporation temperatures). In the case of refrigerated furniture, installation of lids or doors and replacement of lighting systems with others with lower energy consumption and reduced heat dissipation. The equipment shall comply with ecodesign, energy efficiency regulations for commercial and industrial refrigeration installations and the safety of refrigeration facilities.

Sub-measure 2. Market surveillance of compliance with the Energy Labelling Regulation.

Implementation of the Sectoral Market Surveillance Plan for Energy Labelling in the framework of the National Market Surveillance Strategy, in coordination with the Autonomous Communities, which are responsible for this matter.

Sub-measure 3. Public and private lighting or water infrastructure.

Replacing and improving public lighting systems with more light efficient systems, improving the reflective and directional quality of the luminaire and installing systems for regulating the mini-flux of lightpoints and lit and off, allowing them to vary throughout

the night according to the needs of the public and adapting excessive lighting levels, in some cases, to the real needs of this public service, reducing electricity consumption and minimising lightnation contami. In this regard, mechanisms to prevent and reduce light pollution will be strengthened, including, in addition to flow regulation systems or directional criteria, elements such as colour temperature levels. Provision will also be made for support for local authorities in drawing up studies onlight contact and plans to reduce them. In the case of installations in the integral water cycle, efficiency gains due to renovation of pumping and water treatment facilities and, in general, any renovation leading to a reduction in energy consumption.

They are partially included in Component 2 of the PRTR, namely C02.I04: Programme forRe-generation and Demographic Challenge (DUS 5000), with EUR 75 million increased to EUR 675 million ofpre-emption. It is estimated that 50 % of this budget (EUR 335 million) will be earmarked for improving the energyefficiency of public lighting installations owned by municipalities with fewer than 5.000 inhabitants.

In addition, with funding from the FNEE, a call for applications of EUR 100 million, decided in June 2024, was published in 2023 for municipal outdoor lighting installations, of which municipalities and councils are potential beneficiaries.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

- **Legislative measures:** The Council of Ministers on 11 October 2022 approved the Plan More Energy Security (+ SE) to strengthen the protection of citizens from the price hike caused by the war in Ukraine, as part of the European commitment to energy savings. One of the measures envisaged is the creation of a new plan to reduce outdoor lighting consumption, with the aim of replacing the current schemes with more efficient ones, so that interest-free loans will cover up to 100 % of the cost of renovation.

  Royal Decree-Law 18/2022 of 18 October approving measures to strengthen the protection of energy sumers and to contribute to the reductionof natural gas consumption in implementation of the Plan + SE brings forward the amendment of the ITC-EA-01 of Royal Decree 1890/2008 to introduce improvements that have been made in recent years as a result of the technical progress made (Measure 4 of the Plan + SE). The aim is to consider new lighting technologies that were not envisaged in 2008, to increase the energy efficiency of outdoor lighting installations and to give visibility to the energy label for citizens, promoting gene efficiency, given that exposure to the outside is required. In this way, the classification system is updated so that only the most efficient lighting installations will achieve A or B labelling.

  It is planned to publish a revision, increasing the energy efficiency requirements, of Royal Decree 1890/2008 of 14 November approving the Regulation on energy efficiency in outdoor lighting installations and its additional technical instructions EA-01 to EA-07.

- **Public aid programmes: non-repayable and financing**aid for this type of equipment and infrastructure, as well as for the implementation of the Energy Labelling Sector Surveillance Plan. In the case of actions in publicly owned infrastructure, these programmes will be complemented by the necessary technical assistance in defining technical specifications and public procurement.

- **A system of Energy Saving Certificates** (CAE) will make it possible to invest those required by the SNOEE in actions, both replicable and individual, aimed at saving and energy efficiency of cooling equipment, heating and cooling in the tertiary sector, water treatment and desalination processes and lighting installations.

f) Financial needs and public support

The total estimated public budget for the development of this measure for the period 2021-2030 **is EUR 3.947 billion** for a **mobilised investment volume of EUR 6.333 billion**.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be MITECO, together with the Ministries, the Autonomous Communities and local authorities, where appropriate, in accordance with a frameworkof co-management and co-financing of measures and actions in the field of energy efficiency that respects the distribution of competences in Spain.

Agriculture and Fisheries

MEASURE 2.14. ENERGY EFFICIENCY IN FARMS, IRRIGATION COMMUNITIES AND AGRICULTURAL MACHINERY

a) Description

The measure aims to reduce energy consumption on agricultural and livestock farms, Rear Ghentcommunities and agricultural machinery through the modernisation of existing facilities and the renovation or replacement of agricultural machinery and equipment. The measures will be implemented in synergy with those aimed at thepromise of renewables in the sector, within the framework of the Agri-Food PERTE, for which more than EUR 1.000million is earmarked for public investment. In the case of the renewal or replacement of machinery, it will be possible to continue the PIMA TIERRA Plan, which began in 2014 and made it possible to improve the energy classification of tractors and agricultural machinery (in accordance with the methodology developed by the Agricultural Mechanical Station, the official laboratory of the Ministry of Agriculture, Fisheries and Food and the IDAE).

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to achieve 1.296,3 **ktoe of cumulative final energy savings** during theripe 2021-2030.

c) Sectors addressed

This measure is aimed at owners of agricultural holdings and owners or owners of tractors or agricultural machinery.

d) Eligible actions

The following are eligible:

- The replacement of pumping groups, installation of variable frequency drives and static starters in irrigation installations with more energy efficient ones.
- The introduction or modernisation of systems for regulating, controlling and monitoring the irrigation network (capture and storage) that contribute to energy savings.
- Actions on the thermal envelope of livestock farms that significantly reduce the demand for heating and cooling.
- Actions in thermal installations (heating, cooling, ventilation and domestic hot water) that supply production processes for washing, pasteurisation and preservation of perishable products, as well as air-conditioning of livestock farms and greenhouses
- Replacement of conventional energy in thermal installation with renewable thermal energy, heat pumps or a combination thereof.
- Replacement of indoor and outdoor lighting with more energy efficient systems using LED technology.
- Refurbishment of more efficient electric motors in farming services.
- Renewal or remoteness of agricultural machinery, including tractors, self-propelled machinery and towed and suspended machinery, in order to significantly reduce final energy consumption.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

- **Public aid programmes: funded aid**programmes ordered and financing aimed at farms and owners of agricultural machinery.

  In 2021, Royal Decree 149/2021 of 9 March was published, regulating the aid programme for energy efficiency actions on agricultural holdings with a budget of 30 millioneuros to be managed through the Autonomous Communities.

  Also in 2021, in the context of Component 3 of the PRTR, Royal Decree 948/2021 of 2 Decemberestablishing the regulatory bases for the granting of State aid to the focusof investment projects under the Plan to boost the sustainability and competitiveness of agriculture and livestock farming (III) under the PRTR was published. Specifically, in the field of energy, this Royal Decree includes measures in the field of agricultural holdings, aimed at improving energy efficiency, as well asthe gene of energy from renewable sources, in particular biogas and agricultural biomass.

  In order to boost the energy transition of the agricultural sector, it has been considered appropriate to support investments aimed at improving energy efficiency as well as the generation of energy from renewable sources, in particular biogas and agricultural biomass.

  For both economic and environmental reasons, reducing energy consumptionon farms should be a priority. To this end, it is necessary to increase the energy efficiency of installations and to promote the circular economy through actions based on the energy recovery of livestock waste in order to obtain biogas from manure used for energy self-consumption, together with actions on the management, collection and conditioning of biomass of agricultural origin.

  This promotes the improvement of the competitiveness of farms, while contributing to the achievement of the national targets set in both the National Energy and Climate Plan and theNational Air Pollution Control Plan, in terms of energy savings, reduction of emmissionsand promotion of the use of energy from renewable sources.

  Specifically, this support programme is aimed at investments to improve energy efficiency in farm buildings, buildings and ancillary installations and the energy recovery of manure and agricultural biomass, including investments in the construction of low-capacity biogas plants and support for measures relating to the management of agricultural biomass for final energy use, such as the purchase of machinery for the collection or conditioning of agricultural biomass or the construction of logistics or storage centres.

  During 2022, the PERTE for agriculture was approved, which will make available to the agri-food sector an unprecedented set of public support to undertake the necessary energy, green and digital transformation, which will enable it to become more efficient, sustainable and competitive.

- **A system of Energy Saving Certificates** (CAE) will make it possible to invest in the most efficient way possible for those subject to the SNOEE in actions, both replicable and singular, related to energy efficiency in this sector.

- **Information**: preparation of guides and training sessions aimed mainly at irrigation communities.

f) Financial needs and public support

The total estimated public financial support for the development of this measure in the period 2021-2030 amounts **to EUR 1.176 billion,** which will mobilise more **than EUR 4.877 billion of total investment.**

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be the Ministry of Agriculture, Fisheries and Food in the case of the measures in the PRTR relating to the generation of energy from renewable sources and the MITECO, together with the Autonomous Communities, in accordance with a model for co-management and co-financing of energy efficiency measures and actions that respect Spain's competitive distribution.

MEASURE 2.15. ENERGY EFFICIENCY IN THE FISHERIES SECTOR

a) Description

The measure aims to reduce energy consumption in fishing vessels and aquaculture facilities. The measures will be implemented in synergy with those aimed at promoting renewables in the sector and will be financed under the European Maritime Fisheries and Aquaculture Foundation Programme for Spain (20212027).

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure aims to achieve 555,6 **ktoe of cumulative final energy savings** during theperiod 2021-2030.

c) Sectors addressed

This measure is addressed to vessel owners or owners, associative bodies or organisations, ports, port establishments and aquaculture plants, as well as owners of port establishments for thecollection and storage of fisheries.

d) Eligible actions

The following are eligible:

-Fishery:

- Carrying out energy audits
- Measures to improve the hydrodynamics of the hull of vessels.
- Improvement of the propulsion system of vessels. (More energy efficient propellers, populationelements using renewable energy sources, fuel management systems, new nozzles...)
- Reduction of electricity consumption in refrigeration, freezing, lighting or ship isolationissues; thermal energy recovery for on-board ancillary operations or self-generation of electrical power.
- Improving and replacing fishing gear and fishing equipment with more energy efficient ones.
- Carrying out works for the installation of equipment to improve navigation or control of the enginethat is fuelling fuel consumption or for the installation of propulsion systems demonstrating greater energy efficiency.
- Replacement of engines with more energy efficient ones.
- Innovation measures to reduce the carbon footprint of fishing activity or introduction of new or substantially improved products and equipment, such as more energy-efficient or selective fishing gear, techniques or technologies.

-Aquaculture:

- Replacement of water impulse pumps
- Renewable energy generating installations
- Improvements in water abstraction systems to avoid impulse/abstraction costs
- Improvements in filtering systems
- Improvements to water thermal equilibrium systems for production
- Oxygen self-generation facilities to avoid transport with high environmental impact consumption

- Discharge purification systems
- Implementation of new fry transport systems eliminating CO_2 contributions.

† Ports and fishing establishments and fish farms:

- Renewal or replacement of components of vessels, vessels, longliners or other vessels (propellers,motors, propulsion system, hulls and other equipment) that improve the overall energy efficiency of the fishing vessel.
- Replacement of pumping equipment, aeration system, monitoring, control and digitalisation in aquatic plants with more energy efficient ones.
- Replacement of indoor and outdoor lighting with more energy efficient systems using LEDtechnology in ports, fishing establishments and fish farms.
- Renovation or replacement of refrigeration plants in port establishments with moreenergy efficient ones, either by replacing the refrigerant with a lower heating potential or by replacing equipment with better seasonal energy performance.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings targets will be guidedby:

- European Maritime, Fisheries and Aquaculture Fund**Programme for Spain (2021-2027):** This Community fund co-finances energy efficiency improvement measures with national contributions from the AGE and the Autonomous Communities. In addition, energy efficiency measures in the fisheries sector will also be financed from the Recovery, Transformation and Resilience Plan**.**
- Energy**Saving Certificates (CAE) system** will enable the SNOEE obligated parties to be invested as efficiently as possible in actions, both replicable and unique, related to energy efficiency in this sector.
- These decarbonisation developments should be developed in such a way as to ensure that they will not affect protected areas, species and habitats (both the introduction of alternative fuels or energy sources, and the development of new infrastructure and associated discharges).
- **Information**: preparation of guides and training sessions.

f) Financial needs and public support

The total estimated public financial support for the development of this measure in the period 2021-2030 amounts to EUR 5 million.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be the Ministry of Agriculture, Fisheries and Food and MITECO, together with the Autonomous Communities, in accordance with a model for co-management and co-financing of energy efficiency measures and actions that respect Spain's district of competence.

3.2.2 Horizontal measures related to energy efficiency

As explained in section 2.2.1, the reduction in primary energy consumption proposed in this NECP is equivalent to an improvement in the primary energy intensity of the economy of 2.9 % per year until 2030. This improvement in the REEintensity is the result not only of the catalogue of energy efficiency measures for end-use energy in order to comply with Article 8 of the Energy Efficiency Directive, but also of other technological, regulatory and social developments.

These include energy efficiency improvements resulting from technological developments; compliance with new Rulesand Directives; the increase in the vehicle occupancy ratio in urban and interurban environments due to the nearby ofthe car sharing; savings in the aviation, maritime and rail sectors resulting from sectarianpolicies; improving efficiency in energy distribution; the increased penetration of renewable energy into the electricity generation fleet, etc.

In addition, there are 6 horizontal measures that will have an impact on the achievement of theenergy efficiency targets detailed below.

MEASURE 2.16. PROMOTION OF ENERGY PERFORMANCE CONTRACTING

a) Description

Energy Performance Contracts fulfil a dual function, on the one hand, they are contracts that necessarily incorporate energy savings and efficiency, on the other hand contribute to reducing the investment pressure on the part of emdams and public authorities by discharging it in the energy service companies, which will recover the investment through the economic value of the energy savings generated. In other words, they monetise energy efficiency.

The measure, as provided for in Article 29 of Directive (EU) 2023/1791 on energy efficiency, with the aimof promoting the deployment of energy service companies by making available to the public both information on the undertakings providing these services and model contracts for these services adapted to Eurostat's recommendations and in accordance with Law 9/2017 of 8 November 2003 on Public Sector Contracts. In addition, the new Energy Efficiency Directive states that the use of energy performance contracting for the renovation of large buildings owned by public bodies will be promoted, thus, inrenova of non-residential buildings with useful floor area over 750 m², public bodies should assess the feasibility of using energy performance contracting.

The recent publication of the Eurostat guide on the accounting treatment of energy performance contracts(EPC or *Energy Performance Contracts*) has removed one of the main barriers that made it difficult for public administrations to make investments in the energy renovation of their buildings (among other possible energy efficiency improvements) in a scenario characterised by the need to maintain control of the public deficit.

Similarly, the publication by IDAE and ICAEN of standard specifications for carrying out energy performance contracts by public authorities reduces the potential barriers that the public sector might encounter if itwants to use them. However, further work is needed, as barriers such as lack of knowledge,those in application of Law 9/2017 on public sector contracts for this type of contract, etc., still exist.

Of great interest is the recent publication in 2023 of two European EN-UNE standards for this type of service, standard UNE-EN 17669 on minimum requirements for an energy performance contract and standard UNE-EN 17463 on Assessment of energy-related investments (Valeri). This will lead to greater credibility and confidence in such contracts.

Less recent but equally relevant is standard UNE 216701, which establishes a classification of energy service providers whose main objective is to facilitate the identification and selection of the type of supplier if they are energydefects appropriate to the customer's needs.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The objective is to achieve energy efficiency improvements over the period 2021-2030 through savings and efficiency actions through energy service companies and the corresponding energy-saving contracts, where the savings achieved are clearly quantified.

c) Sectors addressed

This measure targets all energy-consuming sectors, mainly industry, servi and buildings,and where the renovation of municipal exterior lighting has a high potential for this financing model.

d) Eligible actions

Basically, all energy performance contracting is so, because it achieves energy savings, which is responsible for recouping the investments made by the energy service companies.

e) Policy mechanisms

The policy mechanisms that will make it possible to achieve the expected savings will focus on: standard measuresdeveloping new model contracts, encouraging these companies in the various aid programmes, as well as information and communication. The promotion of energy projects with a high potentialfor gene saving and enabling investments to be recouped by reducing energy costs or maintaining a better long-term energy supply service. Self-consumption or energy communities are examples of new activities whose procurement allows the emergence of energy prosumer and aggregator, and ultimately of new business models around renewable energy generation and demand reduction.

In renovations of non-residential buildings with useful floor area larger than 750 m² public bodies shall assess the feasibility of using energy performance contracting, in line with Article 29 of the new Energy Efficiency Directive.

To this end, IDAE has drawn up model procurement documents for energy service companies, publishing them on its website to serve as an indicative model for the various parties involved in the formalisation of this type of procurement.

As specific mechanisms, mention can also be made of:

- **Programmes to support the financing** of energy performance contracting that contribute to reducing the return on investment period.
- **A system of Energy Saving Certificates** (CAE) will enable SNOEE obligated parties to be invested as efficiently as possible in actions, both replicable and individual, undertaken in the framework of energy performance contracts, in so far as they contribute to increasing savings and reducing the payback period.

f) Financial needs and public support

IDAE will regain its role as an investor in accordance with its 2024-2026 Investment Strategy, which may, among other things, act jointly with energy service companies in energy-saving and efiscience and renewable energy projects in order to recover investments by means of shared savings (under conditions for promoting both the project and the energy service company), as a way of making the viability and profitability of energy saving and efficiency projects in the private sector visible.

g) Responsible

The public authorities responsible for implementing and monitoring the measure will be MITECOtogether with the Autonomous Communities.

MEASURE 2.17. PUBLIC SECTOR: ACCOUNTABILITY AND EFFICIENT PROCUREMENT ENERGY

a) Description

The measure provides for public administrations to purchase goods, works and services with the lowest environmental impact and the highest possible energy efficiency, both in the construction and in the purchaseor lease of buildings for their own use.

Accountability

In addition to the procurement of renewable energy (Measure 1.26), all local and regional authorities must take a proactive role in promoting energy efficiency, leading the process of energy transition towards a decarbonised economy in 2050.

The energy saving and efficiency plans of the different administrations are key inproviding a leading and exemplary role to deliver

savings and efficiency. Thus, the plan approved in May 2022 for the General State Administration can serve as a model for other public administrations and private entities.

In this regard, Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast) aims to strengthen the exemplary role ofall Public Administrations in energy efficiency and, thus, Articles 5, 6 and 7 thereof lay down obligations for the public sector both for reducing energy consumption, energy renovation of buildings and public procurement.

For its part, Directive (EU) 2024/1275 on the energy performance of buildings, which provides for minimum energy performance standards (MEPS)inexisting edifi, will involve a significant effort of responsibility on the part of the public sector, which must be a frontrunner in meeting and leading in meeting the MEPS requirements.

Furthermore, Royal Decree-Law 24/2021 of 2 November, which transposes, inter alia, Directive (EU) 2019/1161 of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and energy-efficient roadtransport vehicles and setting targets for the purchase of clean vehicles from the Member States, is another proof of this.

Energy efficient public procurement

Spanish legislation has a regulatory framework that encourages the use of energy-saving andenergy efficiency criteria in public procurement procedures for goods, services and buildings[99].

An instrument to boost and facilitate economic growth from the perspective of a circular, low-carbon economy will be the implementation of the Green Public Procurement Plan of the General State Administration (2018-2025), adopted on 7 December 2018.

It also provides for the incorporation of measures aimed at changing the consumption habits of theofficial per sonal, which requires accompanying measures, such as training and information and awareness-raising campaigns.

In this regard, the Plan of Energy Savings and Efficiency Measures of theGeneral State Adminis and State institutional public sector entities was launched in 2022.

Directive (EU) 2019/1161 of the European Parliament and of the Council of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and technologicallyefficient road transport vehicles also requires public authorities to have at their disposal a minimum number of clean vehicles in their fleets. This Directive has been transposed by Royal Decree-Law 24/2021 of 2 November.

The aforementioned Directive (EU) 2023/1791 on energy efficiency allocates Article 7to energy-efficient bu procurement, and sets minimum expenditure thresholds for contracting authorities and contracting entities to purchase only energy-efficient products, services, buildings and works and apply the energy efficiency first principle inaccordance with Article 3 of the Directive. Its Annex IV details the energy efficiency requirements to be observed for public procurement.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The objective is to achieve energy efficiency improvements over the period 2021-2030 through energy renovation, savings and efficiency actions in the public sector, as it will be necessary to reduce the final energy consumption of the public sector by 1.9 % per year (as of October 2025, based on 2021 consumption) and to achieve 3 % annual renovation of the built floor area of buildings owned by the public sector (from October 2025, based on existing buildings as of 1 January 2024).

The public procurement measures will apply to the renewal of 300.000 m^2per year in the General State Administration. In addition, meeting the objective of improving energy efficiency in 2030 requires the adoption by the other territorial administrations of at least

99 Law 15/2014 of 16 September 2011 on the rationalisation of the public sector and other administrative reform measures, which includes in its thirteenth additional provision certain energy efficiency requirements for the purchase of goods, services and buildings for public administrations integrated into the State public sector, and Law 9/2017 of 8 November 2003 on Public Sector Contracts, which promotes the incorporation of award criteria that include environmental, social and innovative criteria aligned with the European policy on green public procurement.

the mandatory target for the General State Administration to renovate 3 % of the built-up and air-conditioned area of thepublic edifi catorio park of the Autonomous Communities and local authorities.

c) Sectors addressed

The public sector.

d) Eligible actions

Eligible actions will be those that achieve reductions in both$_{primary}$ and final CO2 emissions and energy consumption.

- Inclusion of labelling and energy efficiency, environmental and circular economy clauses in public procurement. In any case, in procedures for the award of public contracts and concessions, contracting authorities and contracting entities purchasing products, services, buildings and works shall comply with the energy efficiency requirements set out in Annex IV to Directive (EU) 2023/1791 on energy efficiency.
- Incorporating the carbon footprint into public procurement.
- Optimising the use of public sector buildings by encouraging measures to rationalise the use of buildings by unifying services and pooling staff at the same headquarters.
- Creation of the Inventory of roofs and other infrastructure with energy potential of the General State Administration.
- In a unique way for the building park of the General State Administration, initiate procedures to accommodate both photovoltaic installations for own consumption and supply facilities (by pumping heat or other efficient systems) or energy storage in heating and cooling networks.
- Assessment of the feasibility of contracting through energy performance contracting.

e) Policy mechanisms

The main action measure is the Plan of Energy Savings and Efficiency Measures for the GeneState Administration financed with EUR 1.000 million and the Energy Savings and Efficiency Plans for Autonomous Communities and Local Authorities, both financed by the PRTR.

- Ex ante definition and timing of the renovation of the building stock of the General State Administration, including annual targets for each ministerial department, so as to ensure that the annual renovation target of 3 % of the surface area is achieved100. These actions must be planned and financed by European funds as planned up to 2023 under Thematic Objective 4 (Low-Carbon Economy) of Spain's Multi-Regional Operational Programme and future Operational Programmes.
- Reinforcement of the network of energy managers and managers assigned to the bodies and buildings of the General State Administration for the maintenance of the inventory of the AGE's buildings through the web platform entitled 'Information System for Energy Management of Buildings of the General State Administration (SIGEE-AGE)'.
- Training and information measures aimed at energy managers and managers of the buildings of the General State Administration through specialised publications, IDAE *e-learning* platform and social networks.
- Promoting interconnection to efficient heating and cooling networks, self-consumption and use of renewable energy in public buildings, and, where appropriate, procurement with energy service companies.
- Implementation of a system to regulate the start and off times and the luminous level of exterior lighting of buildings, infrastructure and roads (including tunnels) under the responsibility of the General State Administration and the state institutional public sector.

100 From 2014 to 2 018.1457075 m 2 have been renewed, meeting the renovation target set in Article 6 of the Energy Efficiency Directive of 105 %.

- Implementation of a remote working system in the public sector to reduce the energy impact and make it possible to reduce travel, thereby saving energy, as well as significantly reducing consumption in workplaces, in particular air-conditioning, equipment, lighting, etc.
- Promoting the use of collective and environmentally sustainable transport, e.g. all public buildings with parking places will deploy bicycle parking space.
- Extend this programme to regional and local administrations.
- Where appropriate, the promotion of energy performance contracting by public authorities, as Eurostat does not regard it as public debt, and thus the investment is not accounted for in public accounts, but rather paid as a service against the energy savings generated by the action.
- Inclusion of training actions on energy efficiency in public sector training plans.

One example is the catalogue of environmental clauses provided for in Adif and Adif Alta Velocidad's 2021-2023 Circular Economic Action Plan, which includes criteria for saving and energy efficiency, reducing the carbon footprint, etc. to be applied in their procurement processes.

f) Financial needs and public support

They are not necessary as this measure is a good practice in public procurement and in the habitsof public administration barriers.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will remain MITECO,together with the Autonomous Communities and especially local authorities.

MITECO will promote actions aimed at ensuring that the various entities in the regional and local public sector purchase their energy efficient goods, services and buildings on the market.

The Autonomous Communities shall implement energy efficiency and purchase plans for goods and services in their public buildings under energy and environmental efficiency criteria.

MEASURE 2.18. ENERGY AUDITS AND ENERGY MANAGEMENT SYSTEMS

a) Description

The measure provides for the obligation to carry out energy audits every four years, or the application of an energy or environmental management system, to undertakings that qualify as large undertakings, and to career groupswhich, taking into account the aggregate quantities of all the companies forming the consolidated group, meet the aforementioned large undertaking requirements, and in order to reduce energy consumption.

However, this will change with the transposition of the new energy efficiency directive, according to whichthe mandatory assumptions will be due to consumption. Thus, companies with an average annual consumption of more than 85 TJ in the last three previous years will have to apply an energy management system and companies that consume more than 10 TJ on average per year that do not have an energy management system will have to be subject toenergy audits. Recommendations from energy audits will result in concrete and feasible action plans

Similarly, Measure 20 of the Plan + SE provides for these large companies to draw up and publish plans to contribute to energy savings, including those identified that are most cost-effective and viable in the short term. With the transposition of the new directive, once it enters into force, the persons obliged will become obliged on the basis of their consumption and not on the basis of their size, as has been the case until now.

The Plan + SE, Annex A, also includes the extension of energy audits to the buildings of the General State Administration, in their

exemplary role, and to identify the savings opportunities and the main actions to be implemented in their buildings, as well as the implementation of energy management systems for desalination and water purification processes that contribute to the reduction of energy consumption.

Audits must be carried out by suitably qualified energy auditors (Article 4 of Royal Decree 56/2016 or Royal Decree 921/2022 of 31 October establishing the specialisation course for secondary training in higherdegree in energy audit and laying down the basic aspects of the curriculum). In this regard, it is essential to regulate precisely the technical and professional capacity of auditors and their responsibilities in relationto the suitability of the audit carried out. The inspection must be carried out on a random selection of at least a statistically significant proportion of the undertakings obliged in each four-year period.

Article 6 of Royal Decree 56/2016, which must be transposed in accordance with Article 11 of Directive 2023/1791 on energy efficiency, establishes the Administrative Register of Energy Audits, which containsthe information necessary to identify the undertakings required to carry out audits, the results ofthe findings by the Autonomous Communities, and other information necessary for statistical purposes of sector or energy classification.

It is important to note that carrying out audits *per se* does not represent energy savings. In order to promote these savings, it is important that the audit has minimum quality standards as laid down in RD 56/2016 and that the results of the audit are a serious and reliable element of information so that the relevant energy efficiency measures are actually taken.

There is significant potential for improvement in this area and the following elements will be reviewed:

- The need to regulate more precisely the minimum training or professional profile of the technician responsible for carrying out and signing the audit report
- Promote the implementation of those measures proposed by the audit reports that involve high economic returns or large amounts of savings at reasonable returns. To minimise the investment effort of companies, measures related to energy service companies and energy performance contracting shall be disseminated and promoted; and the use of energy saving certificates, PPAs, as an economic incentive measure.
- Promote programmes targeting SMEs in accordance with the Energy Efficiency Directive for the preparation of energy audits and the implementation of the recommendations resulting from these audits to reduce consumption.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The aim is to achieve energy efficiency improvements over the period 2021-2030 through saving and efficiency actions.

Until 2022, 63.712 installations belonging to 5.444 large companies and groups of companies have been audited, with an estimated energy saving potential of 37.871 GWh/a, representing an average saving of 6.5 % for the audited energy consumption of 587.046 GWh and an associated investment needed of EUR 7.770 million.

Manufacturing is the sector with the highest number of firms that have submitted audits and retail trade has the highest number of audits.

This is to highlight the PERTE for decarbonising the manufacturing industry, which will have to present an Energy Efficiency and Ecological Transition Plan.

c) Sectors addressed

All areas of economic activity defined in the CNAE.

d) Eligible actions

Obliged undertakings or groups of companies may use either of the following two alternatives:

- Carry out an energy audit that complies with the minimum guidelines set out in Royal Decree 56/2016.

- Implement an energy or environmental management system, certified by an independent body in accordance with relevant European or international standards (e.g. UNE-EN ISO 50001, UNE-EN ISO 14001), provided that the management system concerned includes an energy audit carried out in accordance with the minimum guidelines set out in RD 56/2016.

With the transposition of the new energy efficiency directive, the obligated parties will be obliged to do so on the basis of their consumption and not on the basis of their size.

e) Policy mechanisms

MITECO has developed an Administrative Register of Energy Audits for companies obliged to carry out energy audits, containing the information communicated by the obliged parties in relation to the audits carried out.

Furthermore, the public support and financing support programmes defined in section 3.2.1 of this Plan with a sectoral approach will use mandatory energy audits as a prin cipal diagnostictool for the definition of eligible investments needed to achieve the savings. Similarly, energy auditswill be carried out in small and medium-sized companies that are not affected by the obligationarising from the application of the Directive.

f) Financial needs and public support

They are not necessary as a regulated mandate.

g) Responsible

The public authorities responsible for the implementation and monitoring of the measure will be MITECO, together with the Autonomous Communities and local authorities, where appropriate, in accordance with a model for co-management and co-financing of energy efficiency measures and actions that respect Spain's competitive distribution.

The implementation of this measure will be encouraged by MITECO.

The Autonomous Communities are responsible for managing the receipt of audits or information on energy managementtopics and uploading them into the database set up by MITECO as the Administrative Register of Energy Audits.

The Autonomous Communities shall also establish a procedure for inspecting the performance ofenergy audits in order to monitor compliance with the obligation in undertakings to which this Royal Decree applies, and to guarantee and verify the quality of those audits.

MEASURE 2.19. TRAINING OF PROFESSIONALS IN THE ENERGY EFFICIENCY SECTOR

a) Description

Point 4 of the NECP, entitled 'Analysis of the impact of the Plan's policies and measures', estimates an increase in employment of 560.000 jobs in 2030 compared with the baseline scenario. The objective of this measure is to identify bothvocational and academic training needs, resulting from the expected growth in all sectors related to improving energy efficiency.

This measure covers both training and adaptation of workers to the needs of enterprises in the field of energy efficiency. To this end, it is proposed to set up new training courses and to strengthen the training of those which will improve the employability of workers and increase the productivity and competitiveness of enterprises. As part of the new training, GPPs will also be applied in order to closethe gap in the technical professions, so that the necessary positive actions will be implemented, as laid down in Article 11 of Organic Law 3/2007 of 22 March 2015 on effective equality between women and men (LOIEMH). Investment C23.I3 of the PRTR explicitly provides for thepromotion of new skills for the green transition.

In this line, the measure provides for the establishment of specialisation in secondary vocational trainingin energy audit through

Royal Decree 921/2022, officially valid throughout the national territory, as well as the basic aspects of its curriculum, in order to carry out the optional activity of auditing and advising on the use and consumption of energy and its associated cost.

The European Social Fund Strategy Paper 2021-2027 for Spain, ESF +, in its second paragraph of Article 4, the ESF + shall also contribute to the policy objectives of a 'greener, low-carbon Europe by improving the education and training systems needed to adapt skills and qualifications, to upskill all, including the workforce, and to create new jobs in sectors related to the environment, climate and energy, and the bioeconomy'.

To this end, it is proposed to address this cross-cutting principle through employment policies, promoting the adaptability of workers so that they can perform their work with 'low carvoucher' criteria and adapting to climate change. The training of male and female workers should anticipate the expected changes in the market, providing workers with the new skills required, with the main sectors being transformed by the green transition:

- The construction sector, focusing on the rehabilitation of the existing housing stock, with a view to substantially reducing energy consumption in households while ensuring adequate climate comfort.
- Transport sector, which is moving towards replacing fossil fuels with renewable energy carriers.
- The food production sector, which will have to adapt to the climate, which will generally be warmer and characterised by reduced water availability.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The aim is to achieve improved energy efficiency over the period 2021-2030.

c) Sectors addressed

The training sector, both vocational and academic.

The specialisation shall relate to the sectors of buildings, industrial or commercial installations or operations, transport linked to the private or public activity or service, with the aim of identifying and reporting onenergy flowers and their potential for improvement.

d) Eligible actions

Identification of training needs: Definition of the process of identifying training needs in the different sectors in which the production fabric is structured and ordered (methodology, actors involved, data sources).

Public calls for grants to finance training aimed at acquiring and updating new skills for the digital and productive transformation, in line with the productivity and competitiveness requirements of companies, for both large companies and SMEs.

e) Policy mechanisms

Development of investment C23.I3 of the PRTR on Acquisition of new skills for the digital, green and productive transformation.

f) Financial needs and public support

The sectors identified in the energy efficiency dimension (transport, residential industry, tertiary industry, and agriculture and fisheries) are in a continuous process of technological improvement related to energy saving andefficiency, and therefore training and continuous updating of qualified staff is essential. It is therefore necessary to promote continuous training at both professional and academic qualification levels, by developing and implementing new degrees and specialities, and to revise and update existing ones where necessary.

As with the cross-cutting measures proposed in the decarbonisation dimension, in terms of training, the Plan proposes working on identifying the professional profiles needed to increase energy efficiency in Spain and thus be able to achieve the energy efficiency

targets set out in this Plan.

The process starts from the identification of the necessary professional profiles across the value chain associated with the plan's energy efficiency improvement measures. The skill levels will then be adapted to the needs of the labour market resulting from the implementation of the NECP. Work will be done with the associations of identified sectors in the energy efficiency dimension and trade unions to promote the shapeof those profiles that are loss-making.

There is also a need to improve the knowledge in energy efficiency technologies of those professionals who can, across the board, help to develop energy efficiency. This is the case, among others, for professionals in financial institutions, where a better knowledge of these technologies by the financial intermediaries leading the investments would allow increased funding for energy efficiency projects.

In parallel, measures will be put in place to promote and inform about the job opportunities offered by energy saving and efficiency investments that will take place during the energy transition.

Given the speed at which energy and environment-related technologies are developed, it is necessary to monitor and continuously adapt the measures taken, in the light of possible technological changes of an innovative nature.

C23.I3 of the PRTR aims to provide funding to employed and unemployed workers for specific training actions that, according to their profile, are intended respectively to boost their career or improve their employability, identifying the sectors in which their implementation will be implemented, and the entities providing the training.

g) Responsible

Among those responsible for the design and implementation of this measure are bodies of theGeneral State Administration such as the Ministry of Education, Vocational Training and Sport, the Ministry of Science, Innovation and Universities, the Ministry of Labour and the Social Economy, MCI, MITECO, SEPES and INCUAL, with which technical entities such as IDAE, as well as other administrations and organisations, autonomous communities, local authorities, energy agencies, sectoral associations for saving and energy efficiency, orsectoral renewable energy associations, training companies, trade unions and professional associations, among others, will collaborate.

The Ministry of Education, Vocational Training and Sport shall establish the corresponding qualification and the basic aspects of its curriculum.

MITECO will be responsible for promoting this new professional activity in the various energy-consuming sectors.

The Ministry of Labour and the Social Economy in the identification of training needs, in cooperation with theautonomous regions.

MEASURE 2.20. COMMUNICATION AND INFORMATION ON ENERGY EFFICIENCY

a) Description

The communication and information measures included in this NECP must meet the requirementslaid down in Article 20 of the Energy Efficiency Directive, and must also lead to the necessarytransformation of the energy consumption areas required by the transition to a decarbonised economy in 2050.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The aim is to achieve improved energy efficiency over the period 2021-2030.

c) Sectors addressed

All energy consuming sectors and the financial sector.

d) Policy mechanisms

The main driver of this Plan's communication strategy will be the fight against climate change and thelink between energy consumption and pollutant emissions, with a particular focus on local pollution and the transformation of city models. To the extent that this Plan is built on the will to design a just transition towards a new energy model, the communication strategy should provide information in an easy and accessible way to the most vulnerable consumers and households in order to involve them in the necessary trans- socialtraining and reduce energy poverty, with energy awareness and public awareness campaigns being important, highlighting the need to reduce energy consumption.

In addition, this Plan proposes actions aimed at financial institutions as the necessary actors to mobilise the necessary investments to enable energy efficiency improvements by 2030. These actions should improve the knowledge of financial actors to reduce the risk perception of energy saving and efficiency investments, which often penalises and limits access to finance for promoters of such projects.

e) Responsible

MITECO, through IDAE, will have a central role in defining and implementing the communication strategy of the Plan. IDAE has been running regular institutional communication campaigns that have allowedenergy savings to be realised under Article 8 of the Energy Efficiency Directive, and has developed audiovisual projects, publications and training platforms for consumers in different sectors. The IDAEalso has experience in creating and managing profiles relating to energy efficiency on social media.

MEASURE 2.21. OTHER MEASURES TO PROMOTE ENERGY EFFICIENCY: THE TRANSITION IN HIGH-EFFICIENCY COGENERATION

a) Description

Cogeneration has a strong presence in the industrial sector where it is located around 92 % of installed Poten, with the remaining 8 % in the tertiary and residential sectors. The fuel consumed mostly by cogeneration plants is natural gas, which accounts for 84 % in electricity production and 86 % in heat production, although there are also installations that use other conventional or renewable fuels.

It is estimated that by 2030 some 2.400 MW of cogeneration capacity will have exceeded their regulatory lifetime and will therefore have left the primary economic regime. The age of existing installations, as well as the lackof clarity, in some cases, of their redesign to adapt to new circumstances in the processes, leads to a potential loss of efficiency compared to the higher performance of current turbines and engines.

On the other hand, the strong introduction of renewable generation technologies provided for in this National Plan poses a challenge for cogeneration as a back-up system that contributes to the stability of the system, and offers thefeasibility that the operation of the electricity system will require in order to achieve the planned renewable electricity generation targets.

On the basis of the above, it is proposed that auctions be held covering both the modification of existing costs and the construction of new installations for a total of 1.200 MW over the period 2021-2030. The co-generations awarded the auctions shall be designed optimally on the basis of useful heat,electricity consumption, flexibility in their operation for the electricity system and also high efficiency, in linewith all the objectives set out in this Plan.

Lastly, reference can be made to Order TED/526/2024 of 31 May establishing the methodology for updating the remuneration for the operation of standard electricity generation installations whoseoperating techniques depend essentially on the price of the fuel and updating their remuneration values for the application operation from 1 January 2024. This Order establishes a new

methodology, the title of which isthe previous one laid down in Order IET/1345/2015, defining a quarterly update of the remuneration for the operation, which will allow cogeneration, waste treatment and biomass installations to operate with a remuneration for the operation calculated very close to the period in which it will apply and which, by being based on futures prices, will largely prevent installations from being affected by the volatility that may occur on spot markets.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The measure represents savings of 1.471 ktoe of cumulative primary energy over the period 2021-2030.

c) Sectors addressed

This measure is addressed to undertakings in the sectors that carry out a cogeneration installation.

d) Policy mechanisms

The mechanism provided for is the competitive tendering procedure by establishing a multiannual auctionsystem, in order to determine a cost-efficient remuneration system for the implementation of public support,accompanied by the administrative measures necessary to make use of existing infrastructure.

The criteria to be applied in auctions will include, inter alia, the need for installations to be very efficient, with design optimisation based on useful heat and electricity self-consumption, and to provide flexibility in their operation to meet the requirements required by the system operator.

Given the importance of both useful and electric self-consumption in the design of the installation and in obtaining the required efficiencyrates, inspection plans will be carried out to ensure the effective use of the heat provided by cogeneration to the process, as well as the levels of self-consumption of electricity.

e) Responsible

Calls for auctions have to be carried out by MITECO. Cooperation between MITECO and the governments ofthe Canary Islands and the Balearic Islands and cities with the Statute of Autonomy will be required to draw up specific programmes in the non-peninsular terri torios.

3.2.3. Energy efficiency in gas and electricity infrastructure

Spain has introduced measures to remove tariff incentives that undermine the efficiency of energy generation, transmission, distribution and supply or hinder participation in demand response, market equilibrium and the procurement of ancillary services. Barriers to self-consumption have already been removed at the time so that the energy system could start the gradual transition to a distributed, generally low-power model of electricity generation.

Since the adoption of Law 24/2013 of 26 December 2003 on the electricity sector and as a result of the adoption of Royal Decree 216/2014, progress has been made in improving the participation of small consumers in the efficiency of the system and in demand response. Royal Decree 1048/2013 has introduced incentivesto reduce losses on networks; the first is formulated in such a way that a continuous improvement in the level of losses is necessary to achieve an increase in remuneration without penalty, while the latter is designed to reduce fraud.

This NECP takes over the conclusions and proposals of the reports on the assessment of energy efficiency potential in electricity and gas infrastructure approved by CNMC in June 2016.

Measures considered to promote the energy efficiency of national electricity infrastructure include the promotion of efficiency based design criteria, the increase of line and cable sections, the developmentof power factors and voltages, the refurbishment of substations, the optimisation of the low-voltage grid and the meshed grid, demand management, optimisation of the use of smart meters and

reduction of fraud.

In particular for gas infrastructure, both in transmission and distribution networks and in regasification plants, a mechanism has been put in place to recognise losses in installations in order to encourage operators to reduce them.

3.2.4. Financial measures. FNEE

MEASURE 2.22. FINANCIAL MEASURES: ENERGY-EFFICIENCY NATIONAL FUND

(a) Description

Prior to the drafting of the PRTR, the FNEE was the main instrument to support national energyefficiency initiatives. This fund was established by Article 72 of Law 18/2014.

Article 30 of the Energy Efficiency Directive allows Member States to set up an Energy Efficiency National Fund, and expressly recognises that obligated parties under the energy efficiency obligation scheme provided for in Article 8 may fulfil the savings obligation by means of navyfi contributions to that fund, for an amount equivalent to that of the investments required to complywith the obligations arising from that article.

The Fund may receive contributions from other sources such as the ERDF Community Structural Funds, the State's general-assumptions or any other resources intended to finance actions aimed at implementing energy saving and efficiency measures.

This Plan proposes **to energise and integrate financial institutions as the necessary actors** tomobilise inventions in energy efficiency and renewable energies, given that the energy transition must take place with all public and private actors and all regional and local authorities, whatever their nature.

In addition to and aligned with the new Directive (EU) 2023/1791 on energy efficiency, the EENFwill see support and financing mechanisms where financial leverage is as much as possible.

3.2.5. Energy Saving Certificate System

MEASURE 2.23. ENERGY SAVING CERTIFICATE SCHEME

a) Description

Article 71 (2) of Law 18/2014 of 15 October empowers the Government to regulate a system for theimplementation of final energy savings, by issuing Energy Savings Certificates ('CAE') which, once in place, allows those subject to the SNOEE to partially comply with their energy saving obligations at the lowest possible cost, by carrying out or promoting, directly or indirectly, energy efficiency measures in various sectors. Thus, Royal Decree 36/2023, of 24 January, established thesubject matter of the CAE.

The PPAs reflect the annual final energy consumption savings recognised as a result of investments made in energy efficiency actions, which must comply with the principles and methodology for calculating energy savings set out in Annex V to Directive (EU) 2023/1791 on energy efficiency, so that they can be subsequently counted towards compliance with Article 8 of the said Directive.

Therefore, the CAE system makes it possible to certify savings from actions carried out both under standardisedor replicable actions and under the framework of individual actions.

Finally, it should be noted that the acceleration in the implementation of this system of saving certificates hasbeen included as one of the cross-cutting measures of the Energy Efficiency Package of the Energy Security Plan, approved by the Council of Ministers

on 11 October 2022.

Thus, in the context of the SNOEE, and as a complement and alternative to the EENF, thevoluntary CAE scheme is introduced, which will contribute to achieving the ambitious cumulative final energy savings target for the period 2021-2030 and will enable:

a) Improve the economic efficiency of the SNOEE by facilitating the achievement of the national final energy savings target.

b) Make the way in which obligated parties comply with their final energy savings obligations more flexible, allowing all or part of their annual obligation to be met by implementing energy efficiency measures.

c) Enable obligated parties to meet their obligations under the SNOEE at the lowest possible cost.

d) Counting the savings generated as a result of energy efficiency actions carried out by private entities, whether or not they are bound by the SNOEE, and which, as a result of compliance with the materiality principle required by the Energy Efficiency Directive, have so far not been taken into account.

e) Provide the opportunity for final consumers to benefit financially from the energy saving and efficiency measures put in place, not only due to lower costs of their energy bills, but also due to the monetisation of the energy savings achieved. This will also have a stimulating effect, and it may be the final consumers themselves who demand energy efficiency measures.

f) Generate non-energy benefits from investments in energy efficiency in the territories of the various Autonomous Communities and the cities of Ceuta and Melilla, such as boosting skilled employment, developing a business fabric linked to energy efficiency and improving productivity and business competitiveness linked to energy costs.

g) Be a catalyst for innovation in the energy efficiency sector, consolidating an atomised sector and increasing its operational efficiency.

Annually, by ministerial order, each of the persons subject to the SNOEE is assigned a savings obligation. Previously, those obligations could only be satisfied by financial contributions to the EENF.

With the entry into force of the PPA system, part of this annual savings obligation is allowed to bewritten down through the liquidation of PPAs, respecting a minimum financial contribution to the EENF that guarantees thenecessary corrections for the mechanisms and actions financed by it. Thus, each obligated party may decide whether to contribute to the FNEE or to liquidate PPAs in order to fulfil part of its obligation, taking that decision on the basis of the costs that each of those two options has for them.

In addition, Royal Decree 36/2023 establishing a system of energy savings certificates provides for the possibility of incorporating correction coefficients on certified savings todetermine actions, such as those implemented to alleviate energy poverty.

The development of the CAE system takes the form, among other actions, of Order TED/845/2023 of 18 July 2015 approving the catalogue of standardised energy efficiency measures. So far, the catalogue, which has already been expanded, has a total of 114 measure fiches spread over the different sectors in which the NECP sets savings targets. Of these, 15 fiches take into account whether the initial beneficiary is an energy vulnerable consumer, which will help to promote more actions that benefit these people. The breakdown of measure sheets by sector is as follows:

h) Transport sector: 5

i) Industrial sector: 28

j) Residential sector: 43

k) Tertiary sector: 36

l) Agriculture and fisheries: 2

In this regard, it is essential to advance the analysis of new standardised energy efficiency measures to extend the catalogue set out in Order TED/845/2023, especially in the sectors and activities with the greatest difficulties in decarbonising them, such as transport.

b) Cumulative and annual expected savings for each measure or amount of savings in relation to any intermediate period

The introduction of the PPA scheme is expected to achieve cumulative savings of **15.469,16 ktoe** of final energy over the period 2021-2030.

c) Sectors addressed

This measure targets all sectors of economic activity covered as eligible under the SNOEE in the Energy Efficiency Directive.

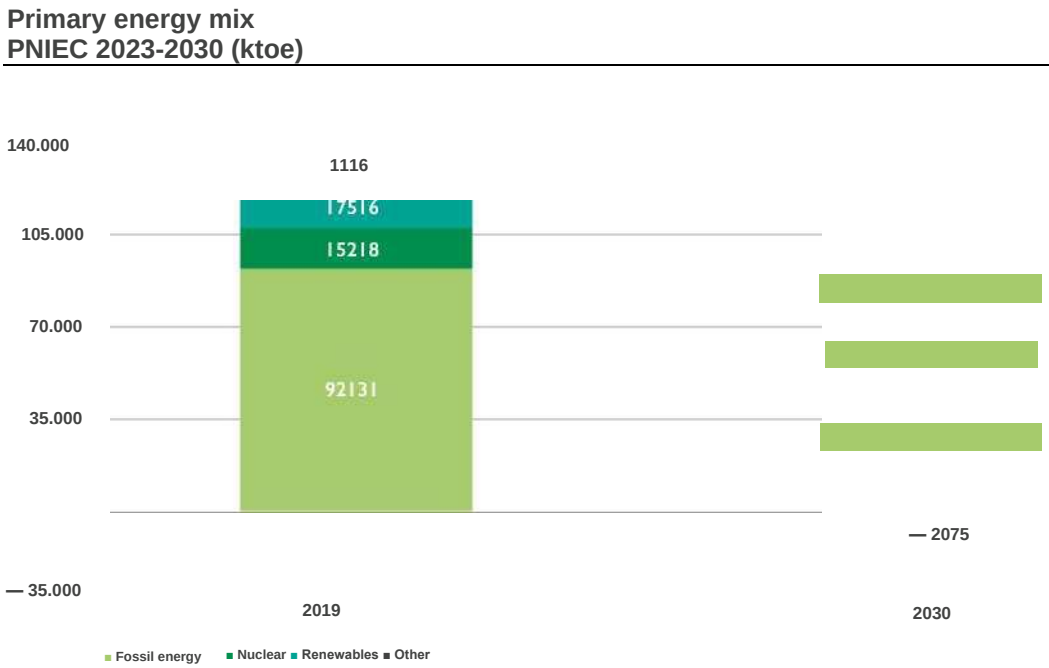
3.3 Dimension energy security

Since the drafting of the 2021-2030 NECP, energy independence has become particularly important due to the volatility of fossil fuel prices and the growing importance of securing energy supply. This energy autonomy is centred around the reduction of external dependence on fossil fuel imports. This need was valued last December 2023, marking the “end principle” of the fossil fuel era at COP 28.

As the REPowerEU Plan presented by the Commission in May 2022 points out, as a response to the challenges and global energy market disruptions caused by Russia’s invasion of Ukraine, long-term energy independence goes hand in hand with a deepening of the green transition. To this end, there are two key drivers for greater energy independence, on the one hand, energy efficiency, which is a transverse elementto this plan and which translates into the reduction of total energy consumption, and, on the other hand, the increase in renewable participation in the energy *mix*, which shifts fossil fuel consumption. In the latter point, it is worth noting the importance of developing indigenous renewable energy sources, which means that this represents in terms of control over the primary resource, of which Spain has a high potential, given our geographical andindustrial characteristics, particularly in the solar and wind sectors.

As a result of this set of energy efficiency measures and the strong boost of indigenous renewable technologies, imports into physical units of fossil fuels rose from 92 Mtoe in 2019 to 56 Mtoe in 2030, a decrease of 39 %. This is an important factor in reducing the energy dependency ratio from 73 % in 2019 to 50 % in 2030, increasing national energy security.

Figure 3.6. Primary energy mix in Spain in 2019 and 2030 (ktoe)



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

REPowerEU aims to make Europe independent from Russian fossil fuels well before 2030 through the implementation of various measures based on three key axes:

- Saving energy
- Accelerate the energy transition
- Diversification to find alternative energy suppliers

The REPowerEU Plan operates in three different time ranges: short, medium and long term. In the first period, theproject includes a series of measures to be implemented in the short term, including:

- Joint purchases of gas, LNG and hydrogen through the EU Energy Platform for all Member States willing to participate, as well as for Ukraine, Moldova, Georgia and the Western Balkans
- New energy partnerships with reliable suppliers, including future cooperation on renewables and low carbon gases
- Rapid roll out of solar and wind energy projects combined with renewable hydrogen deployment to save around 50 000 bcm of gas imports
- Increase the production of biomethane to save 17 000 bcm of gas imports
- Approval of first EU-wide hydrogen projects by the summer
- An EU Save Energy Communication with recommendations for how citizens and businesses can save around 13 000 bcm of gas imports
- Fill gas storage to 80 % of capacity by 1 November 2022

- Demand reduction plans coordinated by the EU in the event of gas supply disruptions.

It also has measures to be implemented in the medium term.

- New national REPowerEU Plans under the modified Recovery and Resilience Fund – to support investment and reforms worth EUR 300 000 billion
- Boosting industrial decarbonisation with EUR 3 000 billion in anticipated projectsgoing to the Innovation Fund
- New legislation and recommendations for faster permitting of renewables especially in dedicated ‘go-to areas’ with low environmental risk
- Investments in an integrated and adapted gas and electricity infrastructure network
- Increased ambition on energy savings by increasing the EU-wide efficiency target from 9 to 11.7 % by 2030, as outlined in Directive (EU) 2023/1791 on energy efficiency.
- Increasing the European renewable energy target for 2030 from 40 to 45 %
- New EU proposals to ensure industry has access to critical raw materials
- Regulatory measures to increase energy efficiency in the transport sector
- Hydrogen accelerator to deliver by 202 517.5 GW of electrolysers and to fuel EU industry with indigenous production of 10 million tonnes of renewable hydrogen
- A modern regulatory framework for hydrogen

Moreover, at the regulatory level, and under REPowerEU, several regulations have been adopted to improve resilience and energy security, mainly dedicated to the natural gas sector:

- The first was Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage. ThisRegulation, inter alia, established an obligation for Member States to maintain a level of stocks in underground storages of at least 80 % on 1 November 2022 and 90 % on 1 November 2023.
- The second was Council Regulation (EU) 2022/1369 of 5 August 2022 on coordinated demand reduction measures for gas, which sets a voluntary natural gas demand reduction target of 15 % compared to the last 5 years average in all Member States. In addition, should a state of alert be declared in the Union, the target will become mandatory in all Member States of the European Union. Article 5 of the Regulation contains certain limitations which may apply to individual Member States.
- Council Regulation (EU) 2022/2577 of 22 December 2022 laying down a frameworkfor the deployment of renewable energy, which contains various provisions to accelerate the development of renewable energy in the Member States.
- Council Regulation (EU) 2023/706 of 30 March 2023 amending Regulation (EU) 2022/1369 as regards the extension of the demand reduction period for demand reduction measures for gas and strengthening the reporting and monitoring of their implementation.

As a result of the adoption of these regulations, Spain has had to adopt regulatory measures and plans to comply with the new European mandates.

With regard to the storage of natural gas, Spain approved, prior to the adoption of the European Regulation, Royal Decree-Law 6/2022 of 29 March 2010 adopting urgent measures under the National Plan, as it addresses the economic and socialconsequences of the war in Ukraine, amending Royal Decree 1716/2004 of 23 July 2009 regulating the obligation to maintain minimum security stocks, the

diversification of sufficient naturalgas and the corporation of strategic reserves of petroleum products. in order to increase the obligation for users to maintain stocks in underground storage, from 20 to 27.5 days of sales or consumption the previous year, enhancing security of supply. The 27.5 days of obligation complied with the obligations to reach 80 % of the maximum natural gas storage capacity on 1 November 2022. Minimum security stocks are divided into:

- Strategic minimum security stocks, equivalent to 10 days of sales or consumption in the previous year. The mobilisation of minimum security stocks of a strategic nature shall be the sole responsibility of the Government.
- Minimum operational stocks of the system, equivalent to 10 days of sales or consumption in the previous year. These stocks will be mobilised exclusively by the owner of the Ministry for the Ecological Transition and the Demographic Challenge.
- Minimum operational stocks of users, equivalent to 7.5 days of sales or consumption in the previous year.

Subsequently, the need to reach 90 % of underground storage filling, imposed indefinitely in Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022, required an annual calculation of the obligation by means of the formula published in Order TED/72/2023 of 26 January, setting outthe procedures necessary to comply with the obligation to maintain minimum natural gas security stocks.

Another issue that has become relevant in recent years is the need for technologies at nationaland European level for the transition to a net-zero economy. In this regard, this update includes ‘Measure 1.18: Strategic autonomy and value chain’ to highlight the relevance of having supply chains of different technologies. This measure is also in line with the Net-Zero Industry Act which highlights the need for 40 % of the technologies needed for the energy transition to be produced in Europe. This objective, translated into an increase in the availability of national technology, is at the same time an opportunity in economic terms and in terms of job creation. Measures withtemperate features in Chapter 3.5 will also contribute to this objective. Research, innovation and competitiveness dimension.

Thus, some of the policies and measures on the energy security dimension fall within the remit of theSpecialised Committee on Energy Security (established by Agreement of the National Security Council (Order PRA/30/2018 of 22 January). This Committee is a supporting body of the National Security Council provided for in Article 20 (3)

of Law 36/2015 of 28 September on National Security, which is responsible for performing the functions assigned by the National Security Council in the field of energy security and within the framework of the National Security System.

The tasks assigned include assessing risks and threats, analysing possible crisis scenarios (especially those likely to lead to a situation of interest to national security in the field ofenergy curity), and assessing the results of their implementation, in coordination with the directly competent bodies and authorities and with the Specialised Committee on Situation.

On the other hand, Target 2 of the National Energy Security Strategy sets out the need to 'consider all energy sources in order to maintain a balanced *mix*, which correctly reflects all the particularities of Spain and which allows for a certain guarantee of supply, at competitive prices, and within a sustainable model in which clean energy gradually acquires greater importance'.

Specifically, in the field of liquid hydrocarbons, the reference standard is Royal Decree 1716/2004 of 23 July 2009 regulating the obligation to maintain minimum security stocks, diversification of natural gas supplies and the Corporation of Strategic Reserves for Petroleum Products (CORES, which wishes to play therole of 'Central Storage Entity'), in accordance with the obligation laid down in Council Directive 2009/119/EC to maintain a minimum level of stocks of crude oil and/or petroleum products.

As regards their geographical location, in 2021 strategic stocks of petroleum products were distributed throughout the national territory as shown in the figure below.

Figure 3.7. Location of strategic reserves in Spain in 2021

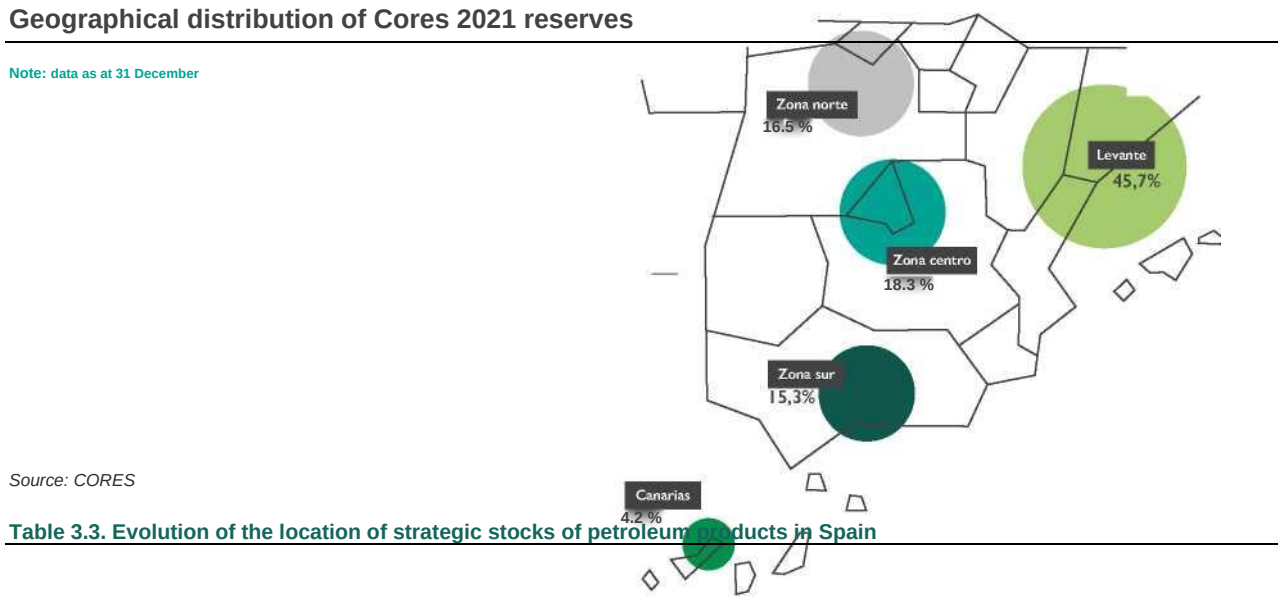


Table 3.3. Evolution of the location of strategic stocks of petroleum products in Spain

Unity: cubic metres

		2017	2018	2019	2020	2021	TV (%) 2021/2020
Northern zone	Products	879.753	862.242	852.392	869.042	850.293	**— 2,2**
	Crude	218.017	218.162	248.162	248.162	248.162	**— —**
Centre Area	Products	1.247.773	1.077.379	1.044.714	1.053.162	1.045.217	**— 0,8**

	Crude	154.368	154.228	169.228	169.228	169.228	— —
Canaries	Products	327.783	327.718	327.718	327.718	280.071	**— 14,5**
	Crude	0,0	0,0	0,0	0,0	0,0	— —
Levante	Products	2.055.394	2.120.424	2.125.676	2.154.513	1.954.258	**— 9,3**
	Crude	1.444.859	1.444.372	1.473.346	1.472.184	1.087.387	**— 26,1**
South Zone	Products	676.645	774.290	719.709	722.770	708.260	**— 2,0**
	Crude	450.356	462.084	386.640	310.733	310.516	**— 0,1**

Note:
Data as at 31 December*Source: CORES*

It should be noted that the energy crisis resulting from the war in Ukraine triggered the establishment of two coordinated actions by the International Energy Agency. Spain joined these actions by releasing 6 million barrels of oil from the minimum security stocks managed by the industry. This release of stocks resulted in a reduction in the obligation to maintain security stocks by 2.6 days initially and by an additional 5.6 days thereafter, so that during a period of 2022 the minimum security stock obligation was 84.2 days. These contributions sought to alleviate market stress and the effects of an unstable supply of crude oil and its derivatives from Russia.

Other emerging risks: cybersecurity

The objective of cybersecurity is to ensure the safe use of network and information and communication systems by strengthening capacities to prevent, detect and respond to cyber-attacks, by leveraging and supporting specificmeasures to contribute to the promotion of a safe and reliable cyberspace.

The process of digital transformation, which has been accelerated by the COVID-19 pandemic, increases both opportunities and challenges in this area. Disruptive and emerging technologies or 5G act as a multi-leverof these opportunities and challenges.

As indicated in the 2023 Annual Report on National Security, cybersecurity preparedness and effectiveness are more essential than ever. Moreover, cybersecurity is a key enabler for many critical sectors to successfully embrace the digital transformation and to fully grasp the economic, social and sustainable benefits of digitalisation.

Critical infrastructures face cyber threats that could materialise in denying the services theyprovide, being particularly vulnerable to cyber threats through the Communication and Information Systems (CIS) communications they use. Despite knowledge, the implementation ofcorrective action is hampered by its high economic cost and the difficulty of disrupting the operation of the critical infrastructure. Efforts to establish a Critical Infrastructure Protection Certification Scheme (ECPIC) continue in this regard.

In 2023, 8050 incidents have been reported to the Ministry of Interior's Cybersecurity Coordination Office (OCC).

Other technologies being developed are those related to electrification and automation of electronics, which are combined in the European concept of Cooperative, Connected and Automated Mobility, and where ensuring cybersecurity will also be a major challenge.

Council Directive 2008/114 of 8 December 2009 on the identification and designation of electronic critical infrastructuresand the assessment of the need to improve their protection is implemented by Law 8/2011 of 28 April 2007 laying down measures for the protection of critical infrastructure and by Royal Decree 704/2011 of 20 May 2007 approving the Regulation on the protection of critical infrastructure. In accordance with the provisions of this RealDe Creto, the designated critical operators in the field of energy and nuclear industry have submitted their respective Operator Safety Plans (PSO), checking that they are in line with the current situation of the threats and challenges faced by critical infrastructures inthe energy sector and in the nuclear industry, updating the information contained in those plans. An important step in the area of cybersecurity in Spain was the reform of the Criminal Code that took place in 2015, which included important amendments to the offences related to computer sabotage, in compliance with Directive 2013/40/EU of the European Parliament and of the Council of 12 August 2013 on attacks against information systems and replacing Council Framework Decision 2005/222/JAI.

The existence of legislation for the protection of critical infrastructures in Spain, since 2011, has also madeit possible to transpose

Directive 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems (NIS Directive), in a rapid and user-friendly manner, as the same procedures and accumulated knowledge have been used to carry out such deployment. The entry into force of Royal Decree-Law 12/2018 of 7 September 2007 on the security of network and information systems, as developed in Royal Decree 43/2021 of 26 January, transposes the aforementioned NIS Directive into Spanish law, which hasgiven a significant boost to the cybersecurity of essential services in the field of energy.

In the current context of the green transition, and in accordance with the new regulatory framework approved both at national level (Law 7/2021 of 20 May on climate change and energy transition) and in the EU (Fit for 55 package) in order to achievethe objective of climate neutrality in 2050, energy policy makes a significant contribution to the achievement of climate change objectives. This is why the 2015 National Energy Security Strategy is in the process of being revised and updated, taking into account the Energy Security + Plan adopted in October 2022, with a cross-cutting approach that integrates energy security and climate security, highlighting the immutabilityof climate change mitigation and adaptation and with content adapted to the new inter-national commitments(both by the COP and the EU).

In accordance with the new National Security Strategy approved in December 2021 (Royal Decree 1150/2021 of 28 December), a new Energy and Climate Security Strategy will be approved, with an innovative approach thatrespects the previous Energy Security Strategies as it will address security in the Energy and Climate Framework. This new approach will take into account the geopolitical, technological, economic and social dimension of the energytransformation process and its contents will be built around three main axes: accelerating the energy transition, protecting the energy and industrial supply chain and fighting climate change.

In addition to this legislative update, Spain approved in April 2019 its National Cybersecurity Strategy, whose role is to develop the forecasts of the 2017 National Security Strategy in the area of cybersecurity, and which replaced the previous one, approved in 2013. Subsequently, in compliance with the mandate issued by theNational Naturity Council and developing the above-mentioned National Cybersecurity Strategy 2019, the National Cybersecurity Plan was approved in March 2022.

Public-private partnerships with the various energy operators have also been enhanced and strengthened, and this work has been coordinated by the Ministry of the Interior's Coordination and Cybersecurity Office (OCC) on cyber incident communication. Attention should also be drawn to the work carried out in this area by the National Cybersecurity Institute (INCIBE), a body under the Ministry for Digital Transformation and the Civil Service.

Note also the Commission Recommendation (EU) 2019/553 of 3 April 2019 on **Cybersecurity in theEnergy Sec**. This Recommendation sets out the key issues in this area, urgingMember States to include them in national legislation and regularly communicate their implementation status to the EuropeanCommission. Spain intends to systematically implement the recommendations on real time requirements for energy infrastructure, on so-called cascading effects and on the appropriate combination of less recent and current technologies (*the combination of legality and state-of-the-art technology*).

In the specific area of the electricity sector, reference should also be made to Commission Delegated Regulation (EU) 2024/1366of 11 March 2024 supplementing Regulation (EU) 2019/943 of the European Parliament andof the Council by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows. That code, provided for in Article 59 of Directive 2019/944 of 5 June 2019 on the internal market in electricity, includes, inter alia:

- A common electrical cybersecurity framework to standardise the measures implemented to protectthe EU's electrical health from a cybersecurity perspective.
- A governance framework for cybersecurity in the electricity system.
- A comprehensive cross-border risk management process.
- Cybersecurity incident management rules.
- A framework for cybersecurity monitoring and reporting in the European electricity system.

The measures associated with the Energy Security Dimension are as follows:

MEASURE 3.1. PLAN + ENERGY SECURITY

a) Description

Spain has adopted an ambitious **Plan called the Energy Security Plan**, which aims to increase Spain's energy security also in the face of energy price developments, as well as to contribute to the European Union's security of supply, identifying measures in three broad categories:

- Measures relating to savings and energy efficiency that reduce the final demand for gas and electricity by means of better management, reducing the energy intensity of activities or more prudent use.
- Measures to accelerate the energy transition and enable the replacement of natural gas and other fossil fuels by renewable energy sources, not only ahead of the winter 2022-23, but also in the longer term, accelerating the reduction of dependence on fossil fuels.
- Measures aimed at strengthening the energy autonomy of our country, providing market-based instruments to manage demand, so that it offers flexibility at times of stress, as well as actions in the short, medium and long term to reduce our country's energy dependence, but also its technological and resource dependence, and the vulnerabilities that such dependence entails.

Additional solidarity measures with the other EU Member States have been added to these measures.

b) Objectives addressed

On an aggregate basis, the implementation of these measures has led to savings in natural gas consumption between August 2022 and March 2023 of 21 %. In addition to increasing consumer protection fornervables, the measures have enabled the energy transition to be boosted, replacing natural gas and other fossil fuels with renewable energies, for example by extending the self-consumption support programme by EUR 500 billion, among many other measures. On an aggregate basis, it is estimated that the implementation of these measures, with a high level of involvement of all actors, can lead to savings ingas consumption in Tural between August 2022 and March 2023 of between 5.1 % and 13.5 %.

c) Policy mechanisms

The Plan provides for a total of 73 measures, with a significant consensus between private actors andpublic administrations.

The measures are structured into 6 blocks:

- Energy savings and efficiency, with measures that minimise the effort needed and generate savings on consumers' bills.
- Boosting the energy transition, accelerating the replacement of fossil fuels by renewables and reducing energy dependency in a structural way.
- Protection of vulnerable consumers, households and businesses, in the face of rising energy prices.
- Fiscal measures to cushion the impact of energy prices while incentivising consumers to switch to transition.
- Strategic autonomy, generating a more robust and flexible energy system with less external dependencies.
- Solidarity, contributing to security of supply and economic activity in Europe, thereby also strengthening security in Spain.

d) Responsible

General State Administration, Autonomous Communities and local authorities.

MEASURE 3.2. MAINTENANCE OF MINIMUM SAFETY STOCKS OF PETROLEUM PRODUCTS AND GAS

a) Description: Petroleum

The obligation to maintain minimum safety stocks of petroleum products in Spain currently amounts to 92 days equivalent to sales or computable consumption, which must be maintained at all times. Of these 92 days, the Corporation of Strategic Reserves for Petroleum Products, CORES, maintains 42 days (strategic stocks), while the industry maintains the remaining 50 days (industry reserves).

Stocks of petroleum products, crude oil and raw materials in December 2023 were 14.285 thousand tonnes held in the form of:

- Raw and raw materials: 33.9 % of total
- Petroleum products (petrol, kerosene, gas oils and fuel oils): 66.1 % of the total.

These reserves accounted for 115 days of net imports, in accordance with the calculation methodology set out inDirective 2009/119/EC, exceeding the European obligation of 90 days. The reserves were held exclusively on national territory.

b) Obliged persons: Petroleum

The persons required to maintain minimum stocks of petroleum products are:

- Wholesale operators of petroleum products.
- Retail distributors (for the part not supplied by wholesale operators, or other retail distributors).
- Consumers (for the part not supplied by wholesale operators and retail distributors).
- The obligation to maintain petroleum products comprises three product groups:
  - Petrol groups: automotive and aviation spirit
  - Medium distillate groups: automotive gas oils, other gas oils, aviation kerosenes and other kerosenes
  - Fuel group

The obligation for each product should be maintained in that product or another product belonging to the same group, but there is also the possibility to hold stocks in the form of a raw material, albeit with a ceiling for each group.

Spanish and Community legislation provides for the possibility of maintaining stocks in other Member States.

c) Description: Gas

The obligation to maintain minimum natural gas security stocks in Spain currently amounts to 27.5 days of sales or firm consumption in the previous calendar year, which must be kept in full by the obligated parties and in underground storage.

CORES is the body responsible for monitoring the maintenance of minimum safety stocks, without being barred,it does not maintain strategic stocks of natural gas.

Minimum security stocks are categorised as:

- Strategic minimum security stocks, equivalent to 10 days of sales or consumption in the previous year. The mobilisation of minimum security stocks of a strategic nature shall be the sole responsibility of the Government.
- Minimum operational stocks of the system, equivalent to 10 days of sales or consumption in the previous year. These stocks will be mobilised exclusively by the owner of the Ministry for the Ecological Transition and the Demographic Challenge.

- Minimum operational stocks of users, equivalent to 7.5 days of sales or consumption in the previous year. They may be available for commercial use without further restriction.

d) Obliged persons: Gas

As regards the minimum security stocks of natural gas, in accordance with the provisions of Article 98 of Law 34/1998 of 7 October 2003, the persons required to maintain them are:

- Traders of natural gas, for their firm sales in the national territory.
- Direct consumers on the market, for the part of their firm consumption not supplied by authorised traders.

e) Policy mechanisms

The draft Royal Decree amending Royal Decree 1716/2004 of 23 July, in order to bring it into line with the provisions of the CommissionMission of 19 October 2018, amends Council Directive 2009/119/EC as regards the methods for calculating storage obligations. This rule transposes into national law the amendment of the sales or consumption period considered for the calculation of the minimum security stock storage obligations and to comply with international obligations in the most efficient way. Efficiency isdetermined by, inter alia, location, cost, obligated persons and products subject to an obligation.

Particular attention needs to be paid to the situation of energy dependency of non-peninsular territories. In particular, the Canary Islands, with a dependence on oil as primary energy of 97 % in 2019 and an isolated electricity system,want a greater interconnection effort between islands, as well as the further development of technologies that promote their decarbonisation (both aspects included in other dimensions of this Plan).

MEASURE 3.3. REDUCING ENERGY DEPENDENCY IN THE ISLANDS

a) Description

Since the 2021-2030 NECP was drawn up, the 'Sustainable Energy Strategy for the Canary Islands' and 'Investment Plan for the Energy Transition of the Balearic Islands', developed by the Autonomous Communities of the Canary Islands and the Balearic Islands respectively, have been drawn up in March 2022.

The **Sustainable Energy Strategy for the Canary Islands**, based on the PNIEC 2021-2030, aims to reduce the energy capacity ofthe islands and to promote the integration of renewables into the territory in order to ensure the stability of the electricity system. The strategy aims to mobilise EUR 466.67 billion through 7 investment programmes. These programmes provide an important boost to the energy transition of the Canary Islands in the coming years, thus making it possible to advance the decarbonisation planned for 2040, in accordance with the terms of the Declaration of Climate Emergency of the Canary Islands approved by Government Agreement in August 2019 and ratified by the Parliament of the Canary Islands in January 2020.

This plan will serve as a lever to meet the objective of reducing the contribution to the eléctri mix offossil fuel plants located in the Canary Islands by at least 50 % compared with the current situation, 2019.

For its part, the Energy Transition Investment Plan of the Balearic Islands aims to push forward an Energy Transition Agenda in the archipelago. This Plan aims to achieve a sociallyjust energy transition, accelerate this transition in the Balearic Islands and address unique challenges in this territory that have not been addressed in other aid lines. The plan is worth EUR 233.34 million and is divided into three main axes (Energy Transition Facilitation Offices, Support to boost the energy transition and Investmentsin Innovative Projects) which are implemented in six programmes. In addition, it should be noted that, in the case of the Balearic Islands, the only existing coal plant closed 2 of its 4 groups in 2020, leaving the remaining 2 as a reserve, with a limit of 500 operating hours per year until 2025 provided that energy supply is guaranteed in accordance with the provisions of Law 10/2019 of 22 February on climate change and energy transition in the Balearic Islands.

b) Policy mechanisms

The current electricity transmission network planning for 2021-2026 proposes ambitiousinvestments in the electricity transmission network in non-peninsular territories with various objectives including interconnections between systems to increase security of supply and reduce generation costs, as well as further integration of renewable electricity generation. In this sentence, the Amendments to Puntual Aspects also incorporate specific actions in the territories of the Balearic Islands and the Canary Islands.

The current planning provides for an interconnection of the non-mainland territory of the autonomous city of Ceuta with theIberian Peninsula. A second electricity interconnection between the Iberian Peninsula and the Balearic Islands is also envisaged.

There will also be a need for mechanisms to boost renewable generation that take into account the particularfeatures of these territories and make it possible to take advantage of the savings in the costs of the system resulting from the introduction of renewable energies, in line with the provisions of Measure 1.22 of this Plan.

c) Financial needs and public support

According to the 2021-2026 Electricity Transport Network Development Plan, in this period EUR 1.109 million is planned to be invested in the Autonomous Community of the Balearic Islands in links to the mainland, in the Canary Islands EUR 104 million in links and EUR 307 million in new actions and in Ceuta EUR 216 million in links.

d) Responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO, together with the respective Autonomous Communities.

As regards deepening the diversification of indigenous energy sources, this will be done in line with technical progress, and provides for the following measure.

MEASURE 3.4. RECHARGING POINTS AND ALTERNATIVE FUELS INFRASTRUCTURE

a) Description

The installation of alternative fuels recharging points will continue to be promoted, in line withRegulation (EU) 2023/1804del of the European Parliament and of the Council on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU. The Regulation recognises amongalternative fuels: electricity, hydrogen and ammonia; between renewable fuels: biomasscombusti, including biogas and biofuels, and synthetic and paraffinic fuels produced from renewable energy; and between non-renewable alternative fuels and transitional fossil fuels: natu gas, liquefied petroleum gas and synthetic and paraffinic fuels produced from non-renewable energy.

With regard to the regulatory framework that applies both to the deployment of recharging points and to the actual regulation of the activity of providing recharging services, a set of regulatory reforms aimed at organising the activity and boosting its deployment have been approved.

On the one hand, Royal Decree 184/2022 of 8 March 2007 regulating the provision of services for the energy charging of electric vehicles has laid down the basis for the provision of this service, establishingrights and obligations for all the actors involved (directly or indirectly) in the provision of the charging service.

Royal Decree-Law 23/2020, of 23 June, approving measures in the field of energy and in other areasfor economic recovery, set up an authorisation and public utility scheme for certain electricity infrastructure with a power greater than 250 kW intended for the installation of charging stations or points, thereby encouraging their deployment and deployment.

Royal Decree-Law 29/2021 of 21 December 2020 adopting urgent measures in the energy field to promote electric mobility, self-consumption and the deployment of renewable energy, once again simplified local procedures for the installation of recharging points in the national territory.

Also, and as instruments of economic incentive, the creation of a specific tariff segment for theJES electricity transmission and distribution pea and electricity system charges, increasing the variable component (and consequently reducing the cost of the fixed component), facilitates its deployment and deployment.

b) Impact of the measure

Together with other measures in the field of transport, the aim is to further electrify the transport sector and increase the use of alternative carbon-free fuels as a guideline for achieving emission reductions in the transport sector.

c) Sectors addressed

This measure targets the electricity, transport and renewable fuel production sectors.

d) Policy mechanisms

Regulation (EU) 2023/1804 of 13 September 2023 on the deployment of alternative fuels infrastructure, setting mandatory national targets for alternative fuels supply infrastructure for road vehicles, trains, vessels and stationary aircraft. It also includes common technical specifications and requirements on user information, data provision and payment methods for this infrastructure. In addition, a National Action Framework should be drawn up settingout the targets, plans and measures to ensure that these objectives are met. The specific case of electric vehicles is addressed in Measure 2.5 of this Plan.

In application of Article 15 of Law 7/2021 of 20 May on climate change and energy transition, the map of charging points has been put into operation at the National Access Point (NAP) of the Directorate-General for Traffic and the Geo-portal101 of the Ministry for the Ecological Transition and the Demographic Challenge. That law also lays down an obligation to install charging points for certain service stations with a large volumeof sales.

In Royal Decree 184/2022 of 8 March 2009 regulating the provision of services for the energy charging of electric vehicles, it laid down the bases for the provision of that service, laying down lodgesand obligations for all the actors involved (directly or indirectly) in the provision of the charging service, thus contributing to the dispatching of the service.

In addition, Royal Decree-Law 4/2024 of 26 June 2015 extending certain measures to address the economic and social consequences of the conflicts in Ukraine and the Middle East and introducingsuch urgent measures in the field of taxation, energy and social matters amended Law 24/2013 of 26 December 2003 on the electricity sector to assign a new function to Red Eléctrica de España, as system operator, for the purpose ofimplementing a dynamic information system for electric charging points, so that it can collect and process the dynamic information provided for in Annex III to Order TED/445/2023.

In addition, under the PRTR and investment C1.I2, a programme of incentives for the deployment of publicly accessible charging infrastructure on roads (MOVES CORREDORES DE RECARGA) is planned to be launched in 2024.

e) Financial needs and public support

The impact analysis chapter analyses these costs.

This public support will specifically take into account the financial needs for the installation of recharging points for electric vehicles, especially those dedicated to heavy-duty vehicles due to their Potencia requirements, both those linked to fleets and publicly accessible ones, and also in ‘shadow’ areas where investments in public charging infrastructure are less attractive to the private sector.

f) Responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO, MIVAU, MITRAMS, MINTUR, together with the Autonomous Communities and local authorities.

101 Hydrocarbon geoportal: Map of fuel prices for petrol stations and electric charging points

Electricity distribution companies also have a key role to play in the deploymentof electric vehicle charging infrastructure.

At the level of preparedness to address constraints or disruptions of supply of energy sources, the following measures contribute to the achievement of the objectives set:

MEASURE 3.5. BOOSTING REGIONAL COOPERATION

a) Description

Increasing physical interconnections with neighbouring energy systems contributes to reducing possiblepacts of limitations or interruptions of national energy supplies. In addition, it favours optimisingthe use of existing capacity by reducing barriers to energy exchange.

In this area, it should be recalled that the regulatory authorities are in constant contact with their central counterpartsfor the proper implementation of European legislation through ACER (*Agency for the Cooperation of Energy Regulators*) and other working groups.

On the other hand, market operators work together to facilitate market integration, as has been shown, in the case of electricity, with Spain's participation in the continuous intraday market.

Similarly, system operators are in regular contact at regional level to analyse and ensure security of supply, implement European legislation and ensure effective use of inter-national interconnectionsthrough the European Network of Transmission System Operators for Electricity (ENTSO-E), the European Networkof Transmission System Operators for Gas (ENTSO-G) and other working groups.

In addition, although this issue is further addressed in the Internal Energy Market dimension, it should be noted that the increase in electricity interconnection capacity with France contributes significantly to reducing the isolation of the Iberian Peninsula from the rest of Europe.

b) Impact of the measure

Improved energy coordination between neighbouring countries.

c) Sectors addressed

Energy sector as a whole.

d) Policy mechanisms

- Regular meetings with France and Portugal to discuss energy security, as well as the most important topics in the field of energy that have arisen in each period
- Participation in the energy fora of the Union for the Mediterranean
- Memorandum of Understanding on cooperation in the field of Renewable Hydrogen with the Netherlands

e) Responsible

MITECO.

MEASURE 3.6. DEEPENING CONTINGENCY PLANS

a) Description

Internally, the Spanish energy system is in an advanced position as regards its contingency preparedness. In this regard, it is worth highlighting the role of Law 8/2011, of 28 April, laying down measures for the protection of critical infrastructure, and its implementing regulation, based on European legislation. However, this preparation needs to be deepened, in the context of the various

international areas to which Spain is committed: IEA and various EU directives and regulations for the electricity and gas sector.

In the electricity sector, the purpose of the preventive and emergency plans is to prevent the triggering of incidents that may have a significant impact on supply or on generating groups, to minimisethe extent and extent of incidents once they occur, and to return the electricity system to the normal state of operation following severe incidents that have led to breakdowns. To this end, segment analyses are carried outat global and zonal level, assessing the risk of supply failure that could result from the production resources themselves, taking into account the availability of fuels, hydroelectric reserves in the reservoirs and hydro, with various assumptions of both demand and availability of the generating groups.

At European level, mention the adoption of the Regulation establishing a network code on the emergenceand restoration of the service,102 which sets out a number of requirements to ensure the safety of Sumi Nistro, the conditions to be met by the operators, the list of managers and priority users, suspension and restoration rules, settlements and test plans.

Furthermore, Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-mitigation in the electricity sector and repealing Directive 2005/89/EC requires Member States to draw upa risk-preparedness plan for the electricity system as a whole. This plan is intended to be a comprehensive document covering all contingency elements that the electricity system as a whole may face.

Following Russia's invasion of Ukraine, these documents have become more relevant and broadened their approach, including, inter alia, the impacts that shortages of certain raw materials (e.g. reduction of natural gas supplies to Europe) may have on the electricity system. The plan to prepare for risks in the electricity sector in Spain is pending approval at national level followingthe preparation of a first draft sent to the European Commission in June 2021.

As regards the gas sector, the rules on infrastructure and supplies in compliancewith Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguardthe security of gas supply have been complied with, with the preparation of the National Risk Assessment, the update of which wasnotified to the Commission in October 2022. The main conclusions of this current risk assessment of the Spanish gas system are as follows:

a) None of the risks identified and analysed pose a gas supply problem to protected customers.

b) Criterion N-1, as input capacity, is incorporated as a design criterion in the mandatory planning of the gas sectors in Spain. Therefore, with the infrastructure planned for the period analysed, the value of the N-1 formula set out in Annex I to Regulation (EC) No 2017/1938 for the Spanish gas system is higher than 100 %, and it is not necessary to apply measures other than those used in the normal operation.

c) The greatest potential risk identified for the Spanish gas system would be the total failure of the main supplier (Algeria). It should be noted that such a ruling has not occurred so far. Even during the period of instability in that country during the 1990s, imports from that country were maintained and this event is therefore considered unlikely.

Also pursuant to Regulation (EU) 2017/1938, the Preventive Action Plan 2023-2026 and the EmergencyPlan 2023-2023 have been drawn up and transmitted to the Commission by the deadline of October 2026.

The Preventive Action Plan sets out all the necessary measures to eliminate or mitigate the risks identified with a view to ensuring the supply of gas to all gas customers and especially to protectedcustomers. Meanwhile, the Emergency Plan contains the actions to be taken in the event of a disruption of natural gas supplies in order to ensure supply to all gas market customers and especially to protected customers. Both plans contain regional chapters drawn up jointly by theMember States that form the risk groups to which Spain belongs, as defined in Annex I to Regulation (EU) 2017/1938: the Norwegian risk group for the supply of gas from the North Sea and the risk group of Algeria for the supply of gas from North Africa.

The risk assessment, the preventive action plan and the emergency plan for the Spanish gas system should be taught every4 years, in line with the repeated regulation.

102 Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on emergency and restoration of service

The Plan + SE, approved in October 2022 (see Measure 3.1), sets out various measures to act on the basis of contingency scenarios.

The proposal for a ministerial order repealing Order ITC/3126/2005 of 5 October 2007 and approving the technical management rules for the gas system (NGTS) are currently being processed. TheMinistry for the Ecological Transition and the Demographic Challenge sets out the measures to be taken in the event of emergency and supply situations, which, among other matters of the gas system, defines protected customers, lays down the measures to be taken in the event of emergencyand wasteful situations and provides for periodic emergency drills.

b) Impact of the measure

Improving the country's energy security.

c) Sectors addressed

This measure targets the energy sector as a whole.

d) Policy mechanisms

The main actions will aim at:

a) The development of the National Security Strategy through the Specialised Committee on Energy Security.

b) Final approval of the risk-preparedness plan in accordance with Regulation 2019/941

c) The evolution of the various preventive and emergency plans in the field of electricity supply, gas supply and oil derivatives.

In the petroleum products sector, the following actions are considered necessary:

a) Update of the Contingency Plan for crisis in oil markets: confidential document drawn up by CORES and regularly updated in accordance with the criteria laid down by the IEA, which sets out four phases of action, which are less serious in terms of possible difficulties in supplying crude oil and petroleum products.

b) Update of the plan of measures to restrict demand in response to crises in the oil market: confidential document, drawn up in 2015 by the MERCOP group (Measures for the Restriction of Petroleum Consumption), specifically created for this purpose and including various ministerial departments and bodies of the General State Administration.

c) Participation in emergency exercises held regularly by the European Commission and the IEA. Example, Spain's participation in the simulated emergency situation organised in May 2024.

d) Modification of the methods for collecting information in order to have up-to-date information on stocks of petroleum products managed by the industry.

In addition, in order to achieve a certain level of energy security at regional level at sea inthe EU, it is necessary to establish objectives and measures for the security of supply of petroleum products at regional level, so that:

a) The storage obligation of 90 days of consumption or 60 days of imports of crude oil and petroleum products can be fulfilled at regional or Community level.

b) Review the proportionality of the level of the obligation and the methodology for stock accounting, both taking into account the reality of the world oil market and the state of the art.

c) The manner of compliance with the obligation is reviewed, so that the inventory accounting methodology incentivises the stock to be constituted in the form of a finished product.

d) The manner in which the obligation is complied with is reviewed so that the methodology for accounting stocks encourages them to build up in the immediate vicinity of the consumption centres, taking into account the mobilisation times.

e) General rules are laid down for the procedure for authorising the fulfilment of an operator's obligations through stocks held

on the territory of other Member States.

At the level of the International Energy Agency, Spain has been actively involved in the development of a new system for the voluntary accounting of stocks of petroleum products to ensure their quality, accessibility and effectiveness.

(e) Responsible

The public authority responsible for the implementation and monitoring of the measures is MITECO.

MEASURE 3.7 PLANNING FOR SAFE OPERATION OF A DECARBONISED ENERGY SYSTEM

a) Description

While the projections in this Plan allow for the fulfilment of the security of supply by 2030, consistency with a decarbonised economy and a 100 % renewable electricity sector by 2050 makes it necessary to anticipate and identify the barriers, requirements and opportunities for operation with full guarantees of supply to the electricity system under those conditions.

It should be noted that such a profound and ambitious transformation of the Spanish energy system as that posed by this Plan entails a number of challenges that cannot be addressed exclusively from the supply side. In particular, the strong focus on renewable energies in the electricity generation sector implies greater variability in generation profiles. This supply-side variability can be offset by the development of different large-scale electricity storage solutions from the same supply side (hydraulic pumping, batteries or other), as well as stronger and manageable renewable generation technologies themselves, as well as from the demand side by promoting the various solutions that provide flexibility to the system. These actions are reflected in 'Measure 1.5. Energy storage'.

At the same time, technological progress makes it possible for there to be a number of technological solutions that have not yet been fully addressed since regulation in the electricity sector, but which are called upon to play an importantrole in ensuring the continuity of electricity supply, in particular the optimisation that makes the intensive use of information and communications technologies in the energy system possible, as well as the analysis of the integration of new solutions.

Thus, also contributing to the Internal Energy Market dimension, the rules on:

- Distributed generation and storage of electricity. This measure includes all developments in relation to own consumption (see Measure 1.6 of this Plan). Collective self-consumption is currently implemented in Royal Decree 244/2019.
- Deepening the removal of barriers related to the electric vehicle, such as the removal of the role of the charge manager (see Measure 2.4). Royal Decree 184/2022 of 8 March 2007 regulates the provision of energy charging services for electric vehicles.
- Enhancing forms of generation aggregation, demand response and storage.
- Participation of renewable technologies in larger electricity system services: diversion management, regulatory services, etc. (see Measure 4.6).
- Newly emerging sectors, through their inclusion in the update of existing regulations, or the creation of specific regulations.

As regards the participation of renewables in electricity system services, Spain is one of the NEROScountries to allow the participation of renewables in the various balancing services. Since February 2016, these facilities have been able to participate in the markets for system adjustment services, after passing the clearance tests. At the beginning of 2018, around half of wind generation had already been authorised to participate in diversion management and tertiary regulation services, demonstrating the rightdrive to integrate renewables into these services. The share of wind technology in adjustment services currently stands at 20 %, highlighting the ability of these technology logies toprovide flexibility to the electricity system, which is critical for ensuring that the decarbonisation objectives are met. The role played in this area by the system operator, whose control centre currently allows for

the observability and controllability of generating plants of more than 1 MW and 10 MW respectively, should be highlighted.

b) Sectors addressed

This measure targets the energy sector as a whole.

c) Policy mechanisms

Following the principle of technological neutrality, MITECO, CNMC and the System Operator shall identify the technologies, procedures and mechanisms to guarantee the supply free of greenhouse gas emissions, with sufficient anticipation to guarantee supply by complying with the path towards climate neutrality in 2050 and avoiding the need for new investments in fossil technologies to guarantee supply.

d) Responsible

The public authorities responsible for the implementation and monitoring of the measure are: MITECO, System Operator and CNMC.

MEASURE 3.8. STRATEGIC RAW MATERIALS FOR THE ENERGY TRANSITION

a) Description

In the process of green transition and global economic paradigm shift, a review of all economic activities, and in particular those related to the extraction of mineral resources, is necessary to ensure their social, environmental and economic sustainability, while promoting a sufficient degree of strategic autonomy. In particular, the energy transition towards a model of generation based on renewable energy sources will reduce our economy's dependence on fossil fuels, but will lead to the emergence of new demands for materials and raw materials.

As stated by the Parliament of the European Union, the transition towards climate neutrality should not leadto the re-emergence of [third country] dependence on fossil fuels by dependence on other raw materials.

In response to this structural situation, the Roadmap for the sustainable management of rare raw materials, approved by the Council of Ministers on 30 August 2022, focuses its attention on the country's strategic autonomy and security of supply of strategic raw materials for the energy and digital transition.

The Roadmap aims to lay the foundations for the transformation of the raw materials industry, in a context of circular economy, and to ensure the supply of indigenous mineral raw materials in Spain in a more sustainable, efficient manner, and which maximises the benefits along the value chain, thus contributing to European and Spanish industrial sovereignty.

The Roadmap deploys a comprehensive set of measures on critical mineral raw materials or onthose that are considered essential for the energy and digital transition, due to their massive use in the deploymentof renewables, batteries for electric vehicles, medium and long-term energy storage, etc., aligning with European policies on access to resources and sustainability, key factors for the EU's resilience.

The design and development of the Roadmap should create a reliable and stable framework that enables and, where appropriate, incentivises domestic and foreign investment, which will foster the sustainability, competitiveness and productivity of businesses, as well**as** the transition of this industry towards a more sustainable economic and social model, respondingto the creation of wealth and employment for Spain, and meeting the challenge of the demographic challenge.

b) Objectives addressed

- Ensure security of supply and reduce strategic dependencies by diversifying sourcing of mineral raw materials.
- Fostering the industry and circular economy of strategic mineral raw materials for the energy and digital transition.

- Implement the Roadmap for the sustainable management of mineral raw materials and Regulation (EU) 2024/1252 establishing a framework for ensuring a secure and sustainable supply of critical raw materials.

c) Policy mechanisms

In order to boost strategic autonomy and foster the strategic mineral raw materials industry, the following measures are envisaged:

- Boosting the circular economy and recycling of strategic raw materials, in line with the Spanish Circular Economy Strategy 2030.
- Improving the Mining regulatory framework for sustainability and compliance.
- Alignment of mining legislation with regulations on strategic industries.
- Drawing up a list of strategic mineral raw materials for the energy transition in order to secure their supply to industry.
- Improving vocational training and qualifications. Adaptation to digitalisation.
- Promotion of innovative projects for strategic mineral raw materials value chains.

d) Responsible

General State Administration, Autonomous Communities and local authorities.

MEASURE 3.9. CYBERSECURITY IN THE ENERGY SECTOR

a) Description

The evolution of the different technologies in the energy sector, as well as the introduction of informational toolsfor energy control and management, require adapting the security standards of the different systems and ensuring adequate protection for users, operators and their data.

With regard to the legislation for the protection of critical infrastructures in Spain, Royal Decree-Law 12/2018 of 7 September on the security of network and information systems, as implemented in Royal Decree 43/2021 of 26 January, transposed the NIS Directive into Spanish law, which has given a significant boost to the cybersecurity of essential services in the field of energy.

In addition, Spain approved in April 2019 its National Cybersecurity Strategy and the National Cyber Security Plan in March 2022. It should also be noted that, since 2015, Spain has had a NationalEnergy Security Strategy that is currently being reviewed and updated, with a cross-cutting approach that integrates energy security and climate security, highlighting the importance of climate change mitigation and adaptation and with content adapted to new international commitments. Finally, Spain is implementing the Commission Recommendation to Member States on Cybersecurity in the[103]Energy Sector of 3 April 2019, which emphasises the cascading effects of potential cyber-attacks on increasingly interconnected electricity and gas networks.

It is necessary to standardise security protocols in *software* and *hardware*, developing specific quality standards for connected systems that consider cybersecurity as a design parameter incalls and applications, at *hardware* and *software* level.

Interoperability is seen as the key to balancing the potential of many genesectors. This requires reviewing and determining the applicability, scope and consistency of the notification requirementsof energy management systems (production, trans-transport, distribution, storage and consumption) of communication protocols and systems. Protocols should be encrypted, authenticated, so that they are compatible and ensure cybersecurity, in line with the requirements of Regulation (EU) 2019/881 on information and communication technology cybersecurity certification.

The same level of data security and data protection should be ensured for large and micro networks. Inaddition, it will be necessary to establish norms and standards for smart household appliances and other devices in the field of IoT (Internet of Things) in order to ensure their interoperability and maintain privacy and cybercurity. An example of the demands are the European Commission's recommendations regarding the cybersecurity of 5G networks.

In particular, in the case of storage in electric vehicles and systems behind the meter, there is a need forharmonised system operation and equipment communication, such as theuse of *vehicle-to-grid* technolo, or communication protocols in the cross-charging infrastructures of electric vehicles, among others.

In the specific area of the electricity sector, attention should also be drawn to Commission Delegated Regulation (EU) 2024/1366 of 11 March 2024 supplementing Regulation (EU) 2019/943 of the European Parliament and of the Council by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows. That code, provided for in Article 59 of Directive 2019/944 of 5 June 2019 on the internal market in electricity, includes, inter alia:

- A common electrical cybersecurity framework aimed at standardising the measures implemented to protect the EU electricity system from a cybersecurity perspective.
- A governance framework for cybersecurity in the electricity system.
- A comprehensive cross-border risk management process.
- Cybersecurity incident management rules.
- A framework for cybersecurity monitoring and reporting in the European electricity system.

103 Commission Recommendation (EU) 2019/553 of 3 April 2019 on cybersecurity in the energy sector

b) Objectives addressed

Strengthen capacities to prevent, detect and respond to cyber-attacks to ensure secure use of energy systems and associated network and information systems.

c) Policy mechanisms

- Incorporate cybersecurity risk analysis into national security of supply regulations for hydrocarbons and electricity, with a particular focus on operators of essential services.
- Incorporate cybersecurity risk analysis into the Preventive Action Plans, Emergency Plans and Risk Assessment of Electrical, Gas and Hydrocarbon Systems.
- Conduct emergency simulation exercises related to cyber attacks.
- Promote cybersecurity certification schemes as stipulated in Regulation (EU) 2019/881 on information and communication technology cybersecurity certification.
- Constant review and updating of applicable cybersecurity procedures and standards.
- Spanish participation in relevant international initiatives.
- Include cybersecurity training in academic and vocational training plans related to energy management systems.

d) Responsible

General State Administration, Autonomous Communities and local authorities.

In conclusion, we would point out the close connection between the energy security dimension and the otherdimensions addressed in this Plan:

a) With the internal market dimension it shares instruments such as electricity and gas interconnections, orthe demand side.

b) R & I & c, since developments in the field of batteries or power-to-gas depend on *the* more economical implementation of these technologies, which are called to be key in the future for security of supply.

c) As regards the decarbonisation dimension, the high penetration of renewables into the system poses challenges in terms of their management-nability, as well as their integration into the transmission and distribution networks.

d) And with the energy efficiency dimension, as several solutions in this area, such as local watchkeeping networks,also contribute to the resilience of the system.

3.4 Dimension internal energy market

3.4.1. Regional cooperation

Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action sets out the obligation for Member States to cooperate with neighbouring Member States for the development of the NECP, in its Article 12. In accordance with this Article, since 2019 bilateral or multilateral meetings have been held with representatives of Portugal, France and the European Commission. Examples in this area are the cooperation initiatives developed overthe years with EU Member States:

a) **Spanish-French cross-border cooperation strategy:**

Negotiated in summer 2022. This includes the study of the impact of the "Cross-border agreement to promote photovoltaic energy" between Spain and France, as well as monitoring the achievements in terms of boosting renewable energy reflected in existing cross-border cooperation agreements, at territorial level. Three instruments are mentioned:

- The agreement between the Autonomous Community of Navarre and the French department of the Pyrenees Atlantic104.
- Mention is also made of the project "Promobiomasse", a project already completed involving Navarra, Catalonia, Aquitaine and Midi-Pyrénées (and Extremadura and Norte de Portugal).
- The EKATE project, Regional Photovoltaic Project between the Basque Country, Navarre, Catalonia, Occitania and Nouvelle-Aquitaine.

b) **XIV Spanish-Portuguese Commission for Cross-Border Cooperation:**

Meeting in Porto on 22 September 2022. Some energy-related aspects were indicated.

- Creating synergies in the different areas associated with the energy transition, strengthening regional cooperation,in parallel with the renewable energy sphere, bearing in mind not only decarbonisation objectives, butalso the role of the sector in stimulating and boosting the economy.

- Move forward with the launch, in Cáceres, of the Iberian Energy Research and Storage Centre, an example of a Spanish-lusa collaboration, along the lines of the International Iberian Nanotechnology Laboratory, and a pioneer projectin the field of renewable energy, including the production and storage of green hydrogen and energy interconnections.

- Deepen joint economic development projects in the area of the new generation battery value chain, acting in an integrated way from lithium exploitation and refining to battery production and recycling for the two main target markets: electric mobility and the management of *micro smart grids*.

c) **Memorandum of Understanding on cooperation in the field of renewable hydrogen between Spain and the Netherlands**

Signed during the International Renewable Energy Conference in Madrid (SPIREC) on 20 February 2023. Spain and the Netherlands set out a framework to promote and enhance cooperation in the field of renewable hydrogen and its derivatives.

It is agreed to cooperate between the two countries in order to:

- Analyse the potential feasibility of renewable hydrogen corridors and certification schemes;

- Developing knowledge sharing on innovative renewable hydrogen technologies;

- Promote joint renewable hydrogen projects, creating new opportunities for companies.

d) **High Level Group on interconnections in south-west Europe**

Based on the Madrid Declaration of 4 March 2015 and ratified in the Lisbon Declaration of 27 July 2018, the European Commission, Spain, Portugal and France agreed to set up and develop this high-level group as a sign of their commitment to developing interconnections and adopting a joint agenda for a successful energy transition.

In particular, on 19 December 2023, the Commissioner for Energy, representing the European Commission, and the Ministers of Energy of Spain, Portugal and France signed a Memorandum of Understanding (MoU) highlighting the importance of building the energy infrastructure needed to achieve a secure and efficient internal energy market and recognising the crucial role of a fully interconnected

104httpsendeavour//www.boe.es/diario_boe/txt.php?id=BOE-A-2021-967

European energy network in ensuring secure, affordable and sustainable energy in the EU. On this basis, with the signature of the MOU, they commit to develop a new Action Plan on interconnections in south-west Europe, with the following commitments:

1) Projects of Common Interest (PCI)

   That, as part of the list, at EU level, of these projects, those relating to South-West Europe interconnections reflect the urgency of integrating the Iberian Peninsula into the energy market and that they are eligible for financial support from the Connecting Europe Facility (CEF).

2) Electricity Action Plan

   Focus efforts on developing priority interconnection projects and support the identification of futurenexions to enable the Iberian peninsula to be better integrated into the integrated energy market.

3) Action plan for offshore infrastructure.

   Identification of priority offshore renewable projects of cross-border relevance and facilitate their development, as well as the development of renewable energy in the Southern and West offshore and Atlantic priority corridors.

4) Hydrogen Action Plan

   Explore the potential of renewable hydrogen on the Iberian Peninsula, as well as the low-emission potential of France, identifying cross-border infrastructure needs from a regional perspective and facilitating its removal, as well as the creation of the Green Energy Corridor, which would connect Portugal, Spain and France to the EuropeanEnergy Tricking Infrastructure.

3.4.2. Measures relating to the Dimension of the Internal Energy Market

With regard to the interconnectivity of the electricity system, work is continuing on what was agreed in the Ma drid Declaration– Energy Interconnections Summit held between Spain, France, Portugal, the European Commission and the European Investment Bank in Madrid on 4 March 2015, ratified in June 2018 with the Lisbon Declaration.

In the Madrid Declaration, a common strategy for the development of electrocity transport activities was adoptedand a new High Level Regional Group for South-Western Europe was set up to promote and monitor interconnection projects. This strategy has been endorsed in the Lisbon Declaration.

Moreover, a key event for the development of the Internal Energy Market took place on 13 June 2024, the date on which the European Intraday Auctions were set up.

All NEMOs and TSOs have introduced a pricing mechanism for intra-day cross-zonal capacities, with the following objectives:

- The promotion of effective competition in the generation, trade and supply of electricity.
- Optimising cross-zonal capacity allocation.
- Ensure equal and non-discriminatory treatment of market participants.

These auctions, at European level, are a key component for the completion of the internal electricity market and, in particular, in relation to the intraday market in Spain and Portugal, the three new European Intraday Auctions (IDAs) have replaced the six MIBEL intraday auctions.

In the area of the Internal Market dimension, the main measures are described below.

MEASURE 4.1. IMPLEMENTATION OF THE NEW ELECTRICITY MARKET DESIGN

a) Description

The European electricity market reform has recently been approved, driven by the aim offostering the resilience of the electricity market, reducing the volatility of final electricity prices, accelerating the penetration of renewables and shifting their low prices to final consumers.

b) Objectives addressed

Spain held the Presidency of the Council of the European Union in the second half of 2023 and, amongits prime rites, highlighted the momentum for electricity market reform, pursuing three main objectives.

The first objective is to ensure that market design ensures competitive and fair prices, reflecting generation costs. This first objective is essential to achieve an efficient and just energy transition,which ranks affordable access to electricity for households, and incentivises the necessary investments in the ElectriFIof our economy. In addition, achieving competitive prices is essential for European industry to compete on a level playing field on international markets.

Second, the future market design should incentivise the necessary investments in renewables that per secommit to meet decarbonisation objectives in the most efficient way possible. Among other things, access to long-term contracts should be facilitated by removing market barriers to the development of PPAs,and by choosing regulatory barriers to the development of CFDs, thus giving certainty to renewable energy investors.

Thirdly, in order to incentivise the necessary investments in technologies that provide the necessary flexibility to thepower support to accommodate the growing intermittent renewable production, various mechanisms have been put in place to facilitate the development of technologies such as storage or demand response. Among them, capacity nestswill have to play a key role in security of supply, shaping them as markets of a highly structural nature, thus making it possible to speed up and facilitate their implementation at national level by the Member States, as reflected in the legislative text of the market reform already approved. The development of these markets is included in Measure 4.3.

c) Policy mechanisms

Spain has been proactively working to push forward a reform of the electricity market that would enable the decarbonisation objectives to be met efficiently, ensure the security of supply of the electricity system and enable all consumers to access electricity supply at a competitive and stable price. To this end, during the first half of 2023, Spain drew up a proposal for a reform of the electricity market, which it submitted to the European Commission and organised working days bringing together the various players in the Spanish energy sector to discuss the main issues related to the reform of the electricity market.

During the second half of 2023, Spain held the Presidency of the Council of the European Union, reaching agreement between the Council of the European Union and the European Parliament on 14 December 2023. Finally, on 26 June 2024, Regulation (EU) 2024/1747 of theEuropean Parliament and of the Council of 13 June 2024 amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union’s electricity market design and Directive (EU) 2024/1711 of the European Parliament and of the Council of 13 June 2024 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union’s electricity market design was published in the Official Journal of the European Union.

The previous pieces of legislation are the new European regulatory framework on which to deploy national policies related to the electricity market in order to achieve the above-mentioned objectives.

d) Responsible

MITECO

MEASURE 4.2. FIGHT AGAINST ENERGY POVERTY

a) Description

The Clean Energy for All Europeans package suggests tackling energy poverty at the root, through targeted social policies and energy efficiency measures, such as the isolation of social housing.

It is also advancing that energy poverty is a major challenge across the EU, stemming from low income and energy inefficient housing. It sets out a new approach to protect vulnerable consumers, including helping Member States reduce energy costs for consumers by supporting energy efficiency investments.

To address this problem, the National Strategy against Energy Poverty (ENPE) 2019-2024 was approved by agreement of the Council of Ministers on 5 April 2019 as the first comprehensive strategy with the aimof establishing the basis for a comprehensive and cross-cutting diagnosis of the incidence and evolution of energy poverty in Spain and of establishing measures to reduce the number of affected households over the 2019-2024 time horizon. To this end, ENPE established an action programme organised around 19 measures and 9 lines organised along 4 strategic axes defined in 2019: improving knowledge of energy poverty (Axis I); improving the response to the current situation of energy poverty (Axis II); creating a structural change for the reduction of energy poverty (Axis III); and consumer protection and social awareness measures (Axis IV). In addition, the ENPE established four indicators following the methodological guidelines of the European Energy Poverty Observatory (EPOV), which were subsequently confirmedby the Energy Poverty Advisory Hub (EPAH), the consortium replacing the EPOV since 2022. They are calculated annually by INE and published by MITECO.

The temporary period covered by this strategy has been highly conditioned by unprecedented events in recent times, of high impact and unpredictable in the international context, such asthe COVID-19 Health Emergency (2020-2021) and the energy price crisis following the invasion of Ukraine (2021-2022).

These substantial changes in the international context have required a response in the form of urgent and cyclical measures to address these exceptional situations, where consumer protectionand security of supply have been the main priorities of the government, prioritising in particular the protection of vulnerable consumers. These short-term measures, together with the first steps in moresevere energy reforms that contribute to the energy transition and consumer protection, have been part of the rollout of this Strategy and complemented it with actions that werenot planned.

The main measures developed so far have been the continued strengthening of social bonds, which have allowed, among others, an increase in the number of households benefiting from the 2019 Social Electric Bonds (BSE) from 1.303.530 to 1 663 420 in April 2024 and, in particular, for households consideredto be vulnerable and severely violating the social bond to pay in 2022 17 % and 28 % less respectively compared to 2021 for their annual light bills.

Progress has also been made in protecting consumers by establishing a vital minimum supply created by Royal Decree-Law 17/2021 of 14 September 2010 on urgent measures to mitigate the impact of the escalation of natural gas prices on the electricity and gas retail markets, and which is set up as an increase in socialprotection against the situation of energy poverty in which vulnerable consumers find themselves. Thus, in application of the precautionary principle, the minimum vital supply establishes a limit power that guarantees minimum comfort conditions, which cannot be exceeded during a period of six months during which supply cannot be interrupted, in accordance with the terms and conditions laid down by law.

In the course of 2024, work will start to develop a new Energy Poverty Strategy, which will review and update the targets with a time horizon 2024-2029.

b) Objectives addressed

The reduction of energy poverty in Spain, as well as the reduction of the impact this state has on a part of the population. The new Strategy will include an update of the objectives.

Table 3.4. Energy poverty targets

Indicator (%)	2021	Minimum target for 2025	Target for 2025
Disproportionate expenditure (2M)	16,4	12,9	8,6
Hidden Energy Poverty (HEP)	9,3	8,6	5,7
Inadequate temperature in the home	14,3	6	4
Late payment of invoices	9,5	5,5	3,7

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

c) Policy mechanisms

The main mechanisms envisaged by the ENPE are social vouchers and minimum vital supply.

In addition, other relevant measures covered by the ENPE are:

- Calculation and regular publication of the evolution of the indicators.
- Promotion of the public housing stock, social rental and comprehensive renovation of buildings.
- Development of studies that help to increase knowledge of the problem and therefore design more effective policy mechanisms.
- Implementation of dissemination measures, establishment of mechanisms for raising awareness and raising collective awareness of the problem of energy poverty in Spain.

d) Responsible

General State Administration (MITECO/IDAE, MINECO, Ministry of Inclusion, Social Security and Migration, National Institute of Social Security), Autonomous Communities and local authorities, sectoral associations, INE.

MEASURE 4.3. CAPACITY MARKET

a) Description

Capacity markets are a necessary tool to undertake the transformation of the electricity system. This Plan includes a 81 % target for renewables in the electricity sector, which will require the various technologies in the generation *mix* to be firm, with the aim of integrating renewable energy from anoptimal scale.

In May 2021, a draft order for the creation of a capacity market in the Spanish electricity market was submitted to a public hearing, thus initiating the approval procedure for these mechanisms. This order aimed to ensure security of electricity supply during the energy transition by incentivising investment in assets that provide flexibility and firmness to the electricity system.

The proposal under hearing is based on a centralised purchase by OS of capacity with differenttime zones: a short-term auction (for the following year and annual contract) combined with a longer-term auction (both as regards the start of delivery and the duration of the contract), limited to new investments.

In addition, in order to be able to implement this capacity market, it is necessary to publish and validate a European coverage assessment, draw up a national adequacy assessment and other studies, after which the European Commission must issue a favourable opinion.

b) Objectives addressed

Implementation of a capacity market for the Spanish electricity system, serving as a lever for thecarbonisation of the electricity system, the integration of renewables and the guarantee of supply.

c) Policy mechanisms

In order to be able to implement this capacity market, it is necessary to draw up a seriesof studies and plans to be approved by the European Commission, including a national coverage analysis, an implementation plan, and to approve a*Value of Loss Load* (VOLL) estimate for different consumer groups.

Part of this work has already been carried out, such as the publication of the implementation plan, drawn up in accordancewith Article 20 (3) of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, or the approval of a national adequacy assessment by the system operator in accordance with Article 24 of that Regulation.

In addition, in the context of the reform of the European electricity market, included in Measure 4.1,capacity mechanisms have been strengthened by no longer being considered a temporary and last-resort instrument and becoming a structural element within the wholesale electricitymarkets. In addition, mandates have been set for the different bodies involved to speed up and facilitate the adoption of such mechanisms by the Member States.

d) Responsible

MITECO

MEASURE 4.4. INCREASING ELECTRICITY INTERCONNECTION IN THE INTERNAL MARKET

(a) Description

A.1 Electricity interconnection with France

Currently, Spain's interconnection with France has a maximum commercial capacity of 2.800 MW (import from France).

The following essential interconnections are being considered:

- Bay of Biscay project: Interconnection between Aquitaine (FR) and the Basque Country (ES). It will allow theinterconnection layer between Spain and France to reach 5.000 MW by 2030.
- Interconnection between Aragon (ES) and *Atlantic Pyrenees* (FR) and interconnection between Navarra (ES) and Landes (FR). Planned for a post-2030 horizon. They will increase the interconnection capacity between Spain andFran cia to 8.000 MW.

Interconnections are the main element of infrastructure enabling progress in the internal energy market, as they enable the exchange of electricity with neighbouring countries, at competitive and homogeneous prices and reduce the volatility of national markets.

They are important for energy security and improve the efficiency of electricity systems by contributing to a more efficient allocation of generation by reducing the need for double installations across borders. Finally, they play an essential role in achieving the energy and climate objectives by enabling the further integration of non-manageable renewable technologies into the grid.

A.2 Electricity interconnection with Portugal

The interconnection of the Spanish electricity system with the Portuguese electricity system is higher than with the French electricity system, as the process leading to the creation of the Iberian Electricity Market (MIBEL) involved a closeco-choice between the governments of both countries. As a result, since its inception in July 2007, MIBEL is one of the most liquid markets in Europe, bringing multiple benefits to consumers in both countries, within a framework of participation open to all interested parties on an equal, transparent and objective basis.

On the Spain-Portugal border, average congestion in recent years is around 5 % and the average price difference between countries is less than EUR 0,3/MWh. The biggest problems are detected in the north. The new nexionjunction already planned at this border will allow Portugal to achieve the interconnection ratio target and allow for full integration of MIBEL in the short term.

However, it is considered appropriate to increase the exchange capacity between Spain and Portugal to 3.000 MW. The project has been included since the first drawing up of the PCI list in 2013105, as well as insubsequent biennial actions and consists of the following facilities on the Spanish side, located in the provinces of Ourense and Pontevedra:

- 400 kV, DC, input and output power line at Beariz of the Cartelle-Mesón do Vento line
- Beariz transport substation at 400 kV
- Power line at 400 kV, DC, Beariz-Fontefría
- Fontefría 400 kV transport substation
- Power line at 400 kV, DC, Fontefría-Portuguese border

b) Impact of the measure

Interconnections are the element enabling progress to be made in the internal energy market, as they make it possible toswitch electricity from one another to neighbouring countries, with competitive and homogeneous prices and reduce the volatility of domesticdock dues. They are equally important for the energy security dimension and improve the efficiency of electricity systems by contributing to a more efficient allocation of generation installations by reducing the need for double installations across borders. Finally, they play an essential role in achieving the energy and climate objectives by enabling the further integration of non-manageable renewable technologies into the grid.

The most important of these projects, the Bay of Biscay, was considered since the first establishment of the ICP list in 2013106, as well as in subsequent biennial updates, such as the Interconnection between Aquitaine (FR) and the Basque Country (ES). This is an interconnection of 400 km long, of which approximately 100 km are terrestrial and 300 km submarine, with an estimated cost of around EUR 2.400 billion. This project will allow the interconnection capacity between Spain and France to reach 5.000 MW. This project has obtained the necessary permits on both sides of the border to start construction in early 2024.

For the others, they are also included from the PCI 2021 list107, and the detail is as follows:

- Interconnection between Aragon (ES) and *Atlantic Pyrenees* (FR).
- Interconnection between Navarra (ES) and Landes (FR.)

These projects are currently still in the process of being defined and are expected to be commissioned beyond 2030.

c) Sectors addressed

This measure targets the electricity sector.

d) Policy mechanisms

D.1 Electricity interconnection with France

The planning of the current transmission network, covering the period 2021-2026, envisages the Bay of Biscay interconnection with France by 2026, with the estimated commissioning of the network by the end of 2028. The planning also covers the interconnections between Aragon (ES) and *Atlantic Pyrenees* (FR) and interconnection between Navarra (ES) and Landes (FR) beyond 2026.

Commission Delegated**105** Regulation (EU) No 1391/2013 of 14 October 2013 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure as regards the Union list of projects of common interest

106 Commission Delegated Regulation (EU) 2018/540 of 23 November 2017 amending Regulation (EU) No 347/2013 as regards the Union list of projects of common interest.

107 Commission Delegated Regulation (EU) 2022/564 of 19 November 2021 amending Regulation (EU) No 347/2013 as regards the Union list of projects of common interest.

D.2 Electricity interconnection with Portugal

The current transmission network planning, covering 2021-2026, provides for this inter-national interconnectionbetween Spain and Portugal. At present, the various projects covered by this interconnection have already obtained prior administrative and construction authorisation.

e) Financial needs and public support

E.1 Electricity interconnection with France

The*Connecting Europe Facilities*(CEF) programme, established by Regulation (EU) 1316/2013 of the European Parliament and of the Council of 11 December 2013, replaced by Regulation (EU) 2021/1153 of the European Parliament and of the Council of 7 July 2021, plays an important role in the financing of electricity interconnections (measures 4.1 and 4.2), as well as theother PCI infrastructure structures. It is designed to promote infrastructure of particular European interest through financial support from the EU through competitive calls for proposals or applications for funding submitted by the bodies responsible for the construction of such infrastructure, subject to the agreement of eachMember State.

For the Bay of Biscay project, project promoters (EER and RTE) requested 800 million euro of CEF funds in the 2017 call. The call was closed at the beginning of 2018 with the award of 578 million euro. According to the above cost allocation, EUR 350 million has been for France and the remaining EUR 228 million for Spain.

The current forecasts foresee an interconnection cost of EUR 2.850 million, with a risk margin of EUR 250 million and a cost sharing between the two countries which will be governed by the coordinated decision of the CNMC and the CRE of September 2017, as amended on the terms agreed last March 2023.

E.2 Electricity interconnection with Portugal

This new interconnection with Portugal, also included in the PCI lists, has an estimated cost of EUR 128 million.

It is estimated that trading capacity with Portugal will increase in 2024-2025, reaching 4.200 MW from Spain to Portugal and 3.500 MW from Portugal to Spain.

f) Responsible

F.1 Electricity interconnection with France

The public authority responsible for approving and monitoring the measure is MITECO, in collaboration with the French Government. Enforcement is carried out by REE together with the electricity carrier in France, RTE.

F.2 Electricity interconnection with Portugal

The public authority responsible for approving and monitoring the measure is MITECO in cooperation with the Portuguese Government. Enforcement is carried out by REE together with the electricity carrier in Portugal, REN.

MEASURE 4.5. ELECTRICITY TRANSMISSION NETWORK DEVELOPMENT PLANS 2021-2026 AND 2025 – 2030

(a) Description

As stated above, the Energy Planning Document, the Electricity Transport Network Development Plan 2021-2026, is currently in force.

The planning process is a regulated process open to the participation of the company, which was initiated in March 2019 by Order TEC/212/2019 of 25 February, initiating the procedure for making proposals for the development of the electricity transmission

network by 2026. At the proposal stage of the 2021-2026 Planning Process, a total of 1.335 proposals were received from 177 subjects.

On the basis of the information obtained, the Studies phase was initiated by Red Eléctrica de España (REE), in its capacity as System Operator. The National Commission on Markets and Competition (CNMC) drew up aform containing its recommendations on the economic implications of the planned investments and their impact on the economic and financial sustainability of the electricity system, published on 2 July 2020.

The submission phase of the proposal to develop the Transport Network 2021-2026 took place between 15 February and 12 April 2021. This is launched simultaneously with the public consultation of the Strategic Environmental Study.

In a second phase of studies, MITECO forwarded all the considerations received to the System Operator, who, on 23 June 2021, drew up the proposal for the development of the transport network.

Finally, the 2021-2026 Electricity Transmission Network Development Plan was transmitted to the Council of Ministers, which was approved on 22 March 2022 by agreement of the Council of Ministers and published by the Resolution of 8 April 2022 of the Secretariat of State for Energy.

As regards binding planning, it covers the electricity transmission network infrastructure needed to ensure security of supply by 2026, mainly addressing the following needs:

a) Improved integration of generation, in particular renewable energy and resolution of technical constraints. Integration of renewables is allowed in line with the objectives set out in this NECP

b) Increasing security of supply by strengthening the transmission network

c) Development of connections with non-peninsular systems and between islands

d) Development of international interconnections

e) Supply of new high-speed train axes

f) Support for the distribution network and new demand from large consumers

Actions that may affect neighbouring electricity systems will be carried out in cooperation with the relevant TSOs in order to minimise possible effects and impacts on both eléctrisystems.

In line with the guiding principle of maximising the use of the existing network, the plan includes, excluding international interconnections, 7.057 km of repowering of the existing network, the change of driver in 300 km of exis linesand the novel provision of dynamic line transmission capacity monitoring systems.

The planning of new lines includes 2.681 km of new axes and 733 km of traces for submarine cables.

As regards the Balearic electricity system, the proposed links result in 65 % of the Balearic supply being served from the Peninsula.

In the Canary Islands' electricity systems, the planned transmission network allows for a substantial improvement in security of supply and, through the further integration of renewables, cooperates in reducing variable costs of generation.

Finally, the ceuti system is integrated with the mainland system by means of an underwater electrical connection.

In line with the provisions of Measure 1.5 of this Plan, in addition to the general principles laid down in Article 9 of Royal Decree 1955/2000 of 1 December regulating the activities of transmission, distribution, marketing, supply and authorisationof electricity installations, the guiding principles for theplanning of the 2021-2026 electricity transmission network are those laid down in Order TEC/212/2019 of 25 February, which initiated the procedure for drawing up proposals for the development of the electricity transmission network by 2026:

1) Delivering on the energy and climate commitments set out in this Plan
2) Maximising the renewable penetration of the electricity system, minimising the risk of discharges, and in a manner compatible with the safety of the electricity system
3) The disposal of renewable energy in areas where there are high renewable resources and where the exploitation and transport of the energy generated is environmentally possible;
4) The contribution, as regards the electricity transmission system, to ensuring the security of supply of the electricity system
5) Compatibility of the development of the electricity transmission network with the environmental restrictions demanded by the Strategic Environmental Assessment of the NECP
6) The removal of existing technical constraints in the electricity transmission system
7) Compliance with the principles of economic efficiency and the principle of economic and financial sustainability of the electricity system
8) Maximising the use of the existing network by renewing, expanding capacity, using new technologies and reusing the uses of existing installations;
9) Reduction of losses for the transport of electric energy to consumption centres

It should also be noted that, at the end of 2 023, a new plan for the transmission of electricity for the period 2025-2030 began to be processed, with the approval of Order TED/1375/2023 of 21 December, initiating the procedure for drawing up proposals for the development of the electricity transmission network for 2030.

This Planning will maintain the guiding principles of the previous Planning, but will also incorporate thefollowing additional principles:

1) The development of energy storage in line with the provisions of the 2021-2030 NECP and any revisions thereto
2) Decarbonisation of industrial activities
3) The development of the industrial value chain linked to the energy transition
4) Territorial cohesion, demographic challenge and just transition

The system operator is currently preparing the initial planning proposal, which must be submitted to the MITERD once it has been completed in order to proceed with its processing.

b) Impact of the measure

Traditionally, electricity transmission network planning consists of a binding part ofthe grid to be built, and an indicative part with demand and generation projections. On this occasion the indicative part is this NECP. The binding planning of the electricity transmission network shall accordingly be adapted to meet the objectives of this Plan and its demand and power park forecasts.

The energy transition process requires proper electricity transmission network planning to enable massive integration of new renewable generation at the pace necessary to achieve the objectives in thelong term, ensuring the safe operation of the electricity system at the minimum cost to consumers. In this regard, the proper design and planning of the project plays an essential role in integrating a larger amount of intermittent electricity generation, enabling the connection of more generation. ASIitself is also expected to see increased importance over the coming years of generation oftaxes from renewable sources and self-consumption.

In addition, the transformation of the energy model will entail a change in the generation mix as a result of the replacement of emission and pollutant generation technologies and the incorporation of new clean and renewable technologies, which in turn will lead to a change in energy flows through the transmission network and in the management of these flows.

Furthermore, in order to minimise the environmental impact, optimise the investments already made and maximise the use of existing

electricity corridors, priority should be given to upgrading and updating the existing network over new routes and infrastructure. These actions may be carried out by increasing the capacity of the network through repowering and the laying of multiple circuits and the use of new technologies. This will be done by ensuring at all times the necessary security of supply and reliability of the electricity transmission network. For the installation of new power lines and their associated infrastructure, account must be taken of the risk of electrocution and collision for birds, so as to minimise the impact of the new lines on bird fauna.

It should also be noted that network planning includes among its purposes the removal of structural technical constraints that cause economic inefficiencies in the system and an overcharge in the price of energy paid by consumers, as well as the minimisation of losses caused by the existence of long-distance power flows to supply major consumption centres.

Finally, it should be borne in mind that energy is a relevant factor in the location of economic activity, so that planning must provide an adequate response to the identified new demand needs, including those arising from the development of high-speed rail infrastructure, thereby contributing to the creation of wealth, employment and the backbone of the territory.

The estimated investment cost of all the actions included in the 2021-2026 Transmission Network Development Plan is EUR 6.964 million, of which EUR 1.260 million relates to actions to strengthen international interconnections and EUR 5.704 million to measures to strengthen the transmission network[108] that make up the national electricity system, which are those which are subject to an investment ceiling in accordance with sectoral legislation. In addition, the modification of specific aspects of the bred transmissionnetwork for the period 2021-2026 represents an additional total investment of EUR 489 billion.

c) Sectors addressed

This measure targets the electricity sector.

d) Policy mechanisms

The development of the future transmission network in accordance with the binding planning set out in the 2021-2026 Electricity Transmission Network Development Plan in accordance with the guiding principles set out in Orden TEC/212/2019 and indicative, which is fully reflected in this NECP. The design of the future transmission system aims to enable the massive integration of new renewable generation, removing the limitationsof the network, covering the needs of international interconnection and the connection of non-peninsular territories, while maintaining and improving the security of supply of the Spanish electricity system.

e) Financial needs and public support

The proposal for the development of the transmission network must comply with the principles contained in Law 24/2013 of 26 December 2003, which include the economic and financial sustainability of the trico systemprovided for in Article 13 of that Law, while respecting the annual investment limits laid down by Royal Decree 1047/2013 of 27 December 2014, which lays down the methodology for calculating the remuneration for the electricity transmission activity.

f) Responsible

The public authority responsible for approving and monitoring the measure is MITECO. Implementation is carried out by TSO, REE.

MEASURE 4.6. ELECTRICITY MARKET INTEGRATION

a) Description

Progress in the integration of the electricity market consists of a number of initiatives that are detailed below:

Further progress will be made on the participation of renewables in balancing and balancing services. While renewable technologies (mainly wind technology) already start to represent a significant market share within the balancing services managed by the system operator (close to 20 per cent), the increased participation of these technologies in balancing services will be needed to achieve the

108 Resolution of 22 April 2024 of the Secretariat of State for Energy publishing the Agreement of the Council of Ministers of 16 April 2024 amending specific aspects of the 2021-2026 electricity transmission network development plan, approved by the Agreement of the Council of Ministers of 22 March 2022 approving the planning of the Horizon 2026 electricity transmission network.

full achievement of the decarbonisation objectives of the electricity system and the economy as a whole. Also, the approval and full deployment of other complementary services (such as the automatic power reduction system foreseen in the operation procedure 3.11) will be crucial to achieve these decarbonisation objectives.

Take the necessary measures to boost the decarbonisation of the economy with the aim of focusingthem on electricity production from fossil fuels to minimise their contribution to the electricity system by 2030.

Carry out the necessary measures to improve the managability of hydropower, thereby maximising the integration of renewable energies (this measure is complemented by the increase of electricity storage, within the energy security dimension).

Encouraging consumer and consumer participation in the electricity market. The European directive and regulation on the internal market incentivise demand response and, in application of this regulation, the market will evolve towards a design that provides effective price signals through which theactive timing of demand and the possibility of aggregation of demand are ensured. The recent approval of the demand-response service, as a specific balancing product, represents an effective means of promoting the demand sideof balancing services, offering flexibility on the demand side that contributes both to security of supply and to the achievement of decarbonisation objectives.

Complete the process of approval of the capacity market, as a capacity mechanism provided for inRegulation (EC) No 2019/943 of 5 June 2019 on the internal electricity market, which contributes to the achievement of the objectives of this Plan, open to the participation of all resources that are in a position to provide the necessary capacity, including energy storage and demand management.

Continue to boost self-consumption and distributed generation (Measure 1.6). In this regard, Royal Decree 244/2019, of 5 April, regulating the administrative, technical and economic conditions for self-consumption of electricity, aims to achieve a strong boost to self-consumption. It should also be noted thatthis provision has partly transposed the provisions of the Renewable Energy Directive.

This Royal Decree also regulates collective self-consumption, allowing various consumers (from a community of owners, a district, an industrial estate, etc.) to benefit collectively from the same nearby generation facilities located in their surroundings, which means that they make better useof the generation capacity and, therefore, the investment to be made.

In this regard, the development of the Energy Communities (Renewable Energy Communities and Citizen's Energy Communities) will be crucial for enabling new vehicles for citizen participation in self-consumption activities, contributing to consumer empowerment and facilitating demand flexibility, which are indispensable for achieving the decarbonisation objectives committed by the Kingdom of Spain. Further development, in accordance with the European Directive and Regulation on the Internal Market, of energy storage as a means of securing electricity supply, will be considered to be able to offer multiple serviceswith features and advantages. Generation, demand and storage will thus be able to bring strength and flexibility, with the appropriate mechanisms, ensuring supply at all times (see Measure 1.5 and Measure 1.6).

Demand management and flexibility (Measure 1.6) also contribute to the integration of the electricity market through active demand response initiatives. In this regard, Royal Decree-Law 17/2022 of 20September 2010 adopting urgent measures in the field of energy creates, through its first additional provision, an active demand response service, as a specific balancing product, which contributes to greater demand participation.

In turn, and as set out in Measure 1.24 Citizens at the centre, in order to promote a pro-active role of the City of Dianiain decarbonisation, regulatory changes at Spanish and European level and technological development meanthat citizens move from being passive consumers to actors and producers and can also participate in demand-side management through energy efficiency systems, the provision of charging services for electric vehicles or other energy services, or the electrification of air-conditioning. This can be extended to industrialand tertiary sectors, in addition to residential sectors. As stated above, energy communities will be a tool for social acceptance and implementation of demand management actions by citizens.

b) Impact of the measure

As a result of Spain's significant effort to deploy smart meters, launched in 2008 and finalisedat the end of 2018, consumers have a

basic tool to know their hourly consumption, putting theminto active consumers and being able to adjust to electricity market prices. Thus, consumers can adjust their demand to those times when market prices are lower, thus contributing to the shift of the demand curve and thereby facilitating a fall in electricity prices.

In this regard, it is essential to continue moving forward with a favourable enabling framework for the promotion ofself-sufficiency and renewable energy communities. In this regard, Royal Decree15/2018 of 5 October 2010 on urgent measures for the energy transition and the protection of consumption has been implemented by Royal Decree 244/2019of 5 April 2007 regulating the administrative, technical and economic conditions for self-consumption of electric energy, with the aim, in its preparation, of seeking the greatest possible simplicity in technical and administrative requirements, so that they do not constitute a barrier to the removalof self-consumption.

Subsequently, successive amendments have been made to incorporate regulatory improvements that would allow greater use to be made of renewable resources. For example, Royal Decree-Law 14/2022 of 1 August 2020 on economic sustainability measures in the field of transport, as regards grants and study grants, as well as measures for saving, energy efficiency and reducing energy dependence on natural gas, which included a system of discount for delay in triggering self-consumption, or Royal Decree-Law 20/2022 of 27 December 2012 on measures to respond to the economic and social consequences of the war in Ukraine and to support the reconstruction of the island of La Palma and other situations of vulnerability, allowing local self-consumption to be extended under certain circumstances.

Royal Decree-Law 15/2018 of 5 October has abolished the concept of charge manager and liberalised chargingcapacity, allowing any consumer to provide charging services. In addition, operators of ports, airports and railway infrastructure, in their capacity as consumers, may provide electricity supply services to vessels, aircraft and railways and services inherent in the provision of the service, allowing vessels and aircraft to stop consuming fuel while in those facilities, which contributes to the objective of low emissions transport. The new regulatory framework linked to charging points is currently Royal Decree 184/2022 of 8 March 2007 regulating the provision of energy charging services for electric vehicles.

On the other hand, the aforementioned Royal Decree-Law 15/2018 of 5 October 2015 amended the rules governingself-consumption in Spain so that consumers/producers, and society as a whole, can benefit from the advantages of this activity, in terms of reduced network needs, greater energy independence and lower greenhouse gas emissions.

In addition, progress needs to be made on a favourable framework for adequate access to consumption data for consumers, such as the promotion of self-consumption and local energy communities, as it hasset out in the following measures: 1.5 Energy storage, 1.8 Development of self-consumption with renewables and distributed generation, 1.23 energy communities and 1.24 citizens at the centre, included in this Plan.

c) Sectors addressed

This measure targets the electricity sector.

d) Policy mechanisms

- Further regulatory development

  This will include the transposition of European legislation and the planning exercise provided for in Measure 3.7.

  The draft Order creating a capacity market in the Spanish electricity siste should also continue tobe highlighted. The incorporation of production facilities from renewable energy sources into the national electricity system may lead, as a collateral effect, to the emergence of certain risks to the security of electricity supply, mainly caused by the variability and intermittency of the generation inherent in this type of installation. This is why, while reinforcing the commitments on the integration of renewables set out above, the set of accompanying instruments needed to guarantee another of the major pillars of the national electricity system, such as the security of Sumi Nistro, must be put inplace. The capacity market proposed in the draft order is established as a centralised system through which the system operator (OS), Red Eléctrica de España, S.A., will contract the needs ofPoten cia firm (in MW) identified in the demand adequacy analyses.

Although this legislation began to be processed in 2021, the obligation to comply with all the requirements laid down in the Regulation (implementation of an implementation plan, a national scab analysis, etc.) has meant that the measure has not been able to achieve all its effects, so that this regulatory development is still pending.

- Self-consumption Route Sheet

The Self-Consumption Roadmap includes 37 awareness-raising and dissemination measures in order to improve awarenessand acceptance of self-consumption by the entire population. The document also includes measures to encourage collective self-consumption and regulatory changes to improve the speed of processing of installations.

- Soft finance and direct investment grants

Royal Decree 477/2021 lays down the bases for aid for self-consumption and thermal renewables, managed by the Autonomous Communities and the cities of Ceuta and Melilla. Its 6 programmes are aimed at the development of self-consumption facilities using renewable energy sources by all economic sectors, as well as the possibility of direct investment by the Autonomous Communities.

- Third-party management or an energy service model

In this model, companies specialising in energy services, such as electricity trading companies, undertake investment in self-consumption facilities and maintain them, withconsumers seeing the energy produced under favourable conditions. This prevents the company, family or consumer administration from having to make the investment or to take responsibility for an activity that is external to them.

e) Responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO and the Autonomous Communities.

MEASURE 4.7. PROTECTION OF ELECTRICITY CONSUMERS AND INCREASED COMPETITION

a) Description

The Energy Union has put the consumer of electricity at the heart of its policies. Energy is a critical good, essential for full participation in modern society. The clean energy transition should therefore also be fair for those vulnerable sectors, regions or segments of society that may be affected by the energy transition.

In the future, all consumers in the EU will have the right to generate electricity for their own consumption, store it, share it or sell it to the market. These changes will make it easier for households to engage in the energy system, better control their consumption and respond to price signals. The new dock duesrules will ensure a high level of protection and good data management. In addition, new services, such as demand response, will help many people and families to significantly reduce their energy bills.

b) Policy mechanisms

This measure is raised in the specific area of protecting electricity consumers and improving the competitiveness of the retail sector. It consists of the following initiatives:

1) Establish a dynamic regulatory framework that adapts to the constant evolution of the sector and protects the most vulnerable consumers by encouraging competitive and transparent prices. To this end, the necessary reforms to the design and functioning of the electricity market will be analysed. In addition, new smarttariff di Seños will be explored, promoting demand management, rational use of infrastructure and contributing to decarbonisation objectives.

2) Facilitate the understanding of tenders and the conditions under which the supply is procured, which will enable them to make

better decisions regarding their electricity consumption, achieving more efficient behaviour and a less harmful impact on the environment.

3) Develop more competitive retail markets and increase the level of consumer empowerment in the retail market.

4) Deepen the promotion of free competition between electricity traders.

5) Implementation of the Plan + SE Plan More Energy Security, which aims to make energy prices more secure from the influence of energy prices on households and the economy as a whole

To this end, the Plan sets out objectives:

- Energy saving measures and substitution by renewables
- Strengthening strategic and energy autonomy
- Solidarity with other Member States

c) Sectors addressed

This measure targets the electricity sector.

d) Responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO, together with the Autonomous Communities and the CNMC.

MEASURE 4.8. ACCESS TO DATA

a) Description

Detailed, accessible and understandable information on their energy consumption is crucial to enable citizens and businesses to make decisions about it, as well as to select more efficient tariffs and investment, and to enable existing or new players, such as aggregators, to offer them different energy services and to perform the functions for which they are empowered by Directive (EU) 2019/944 on common standardsfor the internal market in electricity. In addition, the availability of information on aggregated consumption by the general government is necessary to enable them to assess the effectiveness of energy policies and measures.

Following the deployment of smart metering systems for electricity consumption (already 93 % implemented in Spain in 2018), different data management models currently exist or are being developed in the Member States. For example, in Estonia and Denmark, a central data platform has already been established, operatedby an independent body, another option being the distribution network operators themselves. Regardless of the management model, it is important that transparent rules are put in place under which they can be accessible under non-discriminatory conditions and ensure the veryhigh level of accessibility, usability, cybersecurity and protection, as well as the impartiality of the entities processing them.

The European Commission has recently adopted an implementing act on interoperability requirements and transparent and non-discriminatory procedures for access to metering data and electricity consumption, imple mentioningRegulation of 6.6.2023 on interoperability requirements and non-discriminatory and transparent procedurefor access to metering and consumption data C (2023) 3477, which aims to increase the protection of electricity consumers and their empowerment through digitalisation in order to be more active in the energy transition process. The requirements and procedures implemented by this Commission Regulation will make it possible to ensure that measurement and consumption data in the EU are governed by principles andcriteria.

b) Objectives addressed

Increase public awareness and the key role of citizens in the energy transition, develop innovative energydefects such as, inter alia, aggregation, and analyse the effectiveness of policies and support measures by the public administration, through appropriate access to electricity consumption data.

c) Policy mechanisms

Once the European Commission implementing regulation on interoperability has been adopted, the internal regulatory provisions will be adapted, where appropriate, to bring them into line with the European regulatory framework. It will beproposed to set up the data access platform to use at least those of existing meters and to ensure that:

- Easy use for citizens both to consult their consumer data and to allow access to third parties
- Compliance with data protection rules
- Access to these in near real time and historical consumption
- Access by administration to aggregated data by geographical scope and consumer typology
- Information relevant to the consumer, such as information relating to tariff periods or necessary power
- Development of thermal energy information systems allowing users easy and understandable access to their own data as well as government access to aggregated data.

To this end, the preliminary public consultation on access to and evolution of the system of electric counters was held in September 2020.

(D) Responsible

General State Administration (MITECO/IDAE, MINECO and Ministry of Social Rights, Consumer Affairs and Agenda 2030), CNMC, REE and distribution companies.

As regards the Spanish gas market, its strengthening and development is considered a necessary element in the next decade. However, this development should be framed within the current framework for decarbonising the economy, taking into account the emergence of so-called renewable gases and their integration into the European internal market.

MEASURE 4.9. GAS MARKET INTEGRATION

a) Description

In line with measure 4.6, but focused on the gas sector, the following initiatives are proposed toimprove market gradation:

1) Continue to apply Circular 9/2021 of 15 December 2015 of the National Commission on Markets and Competition amending Circular 8/2019 of 12 December establishing the methodology and conditions for access and capacity allocation in the natural gas system. This Circular allows LNG to be sold without distinction from the plant in which it is physically located, which makes it possible to maximise the use of existing infrastructure in order to contribute to energy solidarity across the EU (covered by the Plan More Energy Security).

2) Increase of interconnection capacity. In 2022, the expansion of the Irún compressor station increased the capacity of the interconnection by 2,5 bcm/year, thus increasing total export capacity to France to 8,5 bcm/year. Furthermore, the use of the 'virtual pipeline' between Spain and Italy will be encouraged by using small methane tankers, as well as the commitment to ship loading services andBunke ring of natural gas at Spanish regasification plants.

3) Optimisation of the storage capacity of liquefied natural gas (LNG) in Spanish plants, as well as their regasification capacity, in order to be able to convert the Spanish gas system into a physical*hub*at Community level, for both natural gas and renewable gas or hydrogen. To this end, the use of the single tank, or virtual balancing tank (TVB), introduced by Circular 8/2019 of 12 December 2015 of the National Commission on Markets and Competition, will be encouraged. Products have also been traded in the virtual tank and virtual storage since 2022, although their liquidity isredacted. Moreover, since 2018 Mibgas Derivatives has also procured market-maker services for forward products.

4) Maintenance of liquidity promotion measures in MIBGAS (increased trading in organised natural gas merch) by means of both mandatory and voluntary market makers at MIBGAS'Virtual Balance Point, in order to make the Spanish gas system more attractive to large international operators.

5) It should be noted that MIBGAS has gained weight in recent years, especially in the case of products delivered up to the following month (short term) at the virtual balancing point, from a traded volume of 39.8 TWh in 2020 to 68.8 TWh in 2021, an increase of 73 %. For long-term products, they increased from 7.5 TWh to 8.1 TWh in the same period of time.

6) Updating the regulation of the hydrocarbons sector, taking into account new developments in Community legislation, in particular the revision of the Regulation and the Hydrogen and Natural Gas Directive.

7) Simplify access and connection to the gas system of renewable gas production plants by establishing relevant access and connection procedures

b) Impact of the measure

This measure shall be implemented by the national regulatory authority and, within the scope of their competences, the CNMC, as well as within the framework of Law 8/2015 of 21 May 2007. This law created the organised gas market (MIB- GAS) and designated the market operator, with the aim of remedying the absence of an organised secunwholesale market, providing a transparent price signal and encouraging the growth of competition in the sector.

As for the electricity market, gas also considers facilitating the entry of new traders and producers of renewable gas, as well as reducing the administrative burden for natural gas traders in their relations with the government.

c) Sectors addressed

This measure targets the gas sector.

d) Responsible

The public authority responsible for the implementation and monitoring of the measure is MITECO.

MEASURE 4.10. PROTECTION OF GAS CONSUMERS AND DEMAND-SIDE MANAGEMENT

a) Description

In the area of consumer protection, in response to the overall objective of providing consumers withadequate protection in relation to their supply, as well as the information needed to enable them to take their natural gas consumption decisions in full independence, the following initiatives are proposed:

1) Deployment of smart meters: on the basis of the cost-benefit analysis drawn up by the CNMC in compliance with the fourth additional provision of Order ETU/1283/2017 of 22 December, and in compliance with the provisions of Article 14 of Royal Decree-Law 18/2022 of 18 October, draw up a Ministerial Order laying down the development plans for the deployment of smart meters for natural gas, as well as their minimum specifications.

2) Speeding up the process of changing the marketer: measure directly linked to the previous one, since the installation of meters with telemetering capacities significantly reduces the time needed, and also introduces a procedure that prevents any delay and extends the control powers by the regulator, by amending Articles 43 and 44 of Royal Decree 1434/2002.

3) Acceleration of connections: by introducing the possibility for the applicant to execute it himself, by meansof the definition of Article 25 of Royal Decree 1434/2002.

4) Fraud reduction: strengthen the role of distributors in detecting fraud and communication procedures to traders, by amending Articles 61 and 62 of Royal Decree 1434/2002. To this end, it will significantly help the introduction of smart meters, due to their increased capacity to detect fraud and the speed it makes it possible to act on them.

5) Prevent the suspension of supply in extreme weather situations, as set out in the National Strategy against Energy Poverty 2019-2024.

   In this respect, it should be noted that, following the situation of high prices, volatilities and uncertainties experienced by gas markets in recent times, a wide range of consumer protection measures have been implemented. These include the limitation of the increase in the price of the Last Appeal Tariff, introduced by Royal Decree-Law 17/2021 of 14 September 2015, and the extension of that tariff to owners' associations which, because of their combined consumption, exceeded themaximum consumption limits permitted to benefit from that tariff. The latter measure was approved by Royal Decree-Law 18/2022 of 18 October, which in turn includes amendments to Articles 38 and 40 of Royal Decree 1434/2002 of 27 December.

6) Analyse, by drawing up a Demand Management Plan, so that, in the event of a significant risk tosecurity of energy supply, the service to protected customers can continue to be maintained. This will require an analysis of possible scenarios and measures that could include the possible discontinuation of unprotected customers.

7) Finally, the recently adopted decarbonised gases and hydrogen package includes consumer protection provisions to be duly adopted at national level.

   In addition, the social thermal voucher has been reinforced on several occasions, either by increasing coverage or minimum support per beneficiary, all of which is accompanied by subsequent budgetary reinforcements.

b) Impact of the measure

This measure will, on the one hand, provide consumers with the ability to know at all times the volumesof gas consumed and their environmental footprint (emissions, proportion of renewable gas consumed, real time consumption,*online*billing consultation, etc.), as well as planning for a natural gas supply scenario recommending the interruption of supply to firm unprotected customers, as set out by the EU in the European Commission communication 'Save gas for a safe winter' of 20 July 2022, for the various industrial and economic sectors that consume natural gas.

c) Sectors addressed

This measure targets the gas sector.

d) Responsible

The public authority responsible for the implementation and monitoring of the measure is MITECO.

MEASURE 4.11. IMPROVING THE COMPETITIVENESS OF THE GAS RETAIL SECTOR

a) Description

The following initiatives are considered:

1) New obligations on dominant operators in the natural gas sector based on their retail market share

2) Creation of a single point of statistical transmission by traders to the General State Administration, centralised at the State Secretariat for Energy, which in turn provides information to the other bodies that need it (CNMC, CORES)

3) Speeding up the electronic procedure for registering new traders

In this regard, it is worth recalling the effect that measures such as those contained in Real Decre to-Law15/2018 have already had, consisting of introducing an exemption from the excise duty on hydrocarbons for energy products used in the production of electricity in power plants or cogeneration of electricity and heat in combined plants.

b) Impact of the measure

Together with the previous one, this measure will improve consumers*' ability to know at all times the volumes of gas consumed and their environmental footprint (emissions, share of renewable gas consumed, real-time consumption, online* billing consultation, etc.).

c) Sectors addressed

This measure targets the gas sector.

d) Responsible

The public authority responsible for the implementation and monitoring of the measure is MITECO.

MEASURE 4.12. IBERIAN HYDROGEN CORRIDOR. H2MED

a) Description

The Iberian Peninsula has great potential for the production of green hydrogen, produced by electrolysis from renewable electricity. The H2Med energy interconnection project is the first major green corridor to connect the Iberian Peninsula to the rest of Europe and to be operational in 2030. The backbone network, in particular, aims to connect the green hydrogen production sites on the Iberian Peninsula with domestic demand for hydrogen, the coverage of which at national level is a priority. Driven by the governments of **Spain, Portugal and France, the H2Med includes two cross-border infrastructures**, one between Celorico da Beira (Portugal) and Zamora, referred to as CelZa, another, submarine, between Barcelona and Marseille (France), known as BarMar. It also includes a axis running through the Cantabrian, north-east and Mediterranean coast and one along the west and south of the country. H2Med plans to be operational in 2030 and is expected to be able to transport 2 million tonnes of green hydrogen per year fromSpain, representing 10 % of the total EU consumption. In 2050, it is estimated that 20 % of all energy in Europe will be renewable hydrogen. These projects have been submitted by promoters as candidates for **projects of common interest for the European internal market (PCI),** as they are considered to be international infrastructure enhancers and enablers. Once considered as a PCI, the project will have the possibility of accelerated processing, which should belocked within 36 months. After the permit, the installation would start, which is expected to be completed in 2030.

According to the preliminary technical specifications of the H2Med project, the section between Celorico (Portugal) and Zamora will extend over 248 kilometres. The estimated cost is **350 MEUR.**

The projected cost is EUR **2.500** million for a 455-kilometre connection for the Finellona-Marseille section (France). Its inclusion on the PCI list, in addition to fast-track processing, gives rise to eligibility for the *Connecting Europe Facility* (CEF) funds for energy, which makes it easier to obtain a **maximum aid intensity of 50 %**. In particular, **for studies**, the mechanism allows funding up to **50 % of total eligible costs** and **for works** up to **50 % of the total eligible costs**.

Cumulation of aid is allowed provided that the same eligible cost is not financed. Therefore, CEF grants can be combined with other sources of financing, such as the European Investment Bank or national promotional banks or other public and development finance institutions, as well as private sector financial institutions and private sector investors, including through public-private partnerships.

With a view to facilitating the processing of the infrastructure included among projects of common interest, Royal Decree-Law 8/2023 of 27 December adopting measures to address the economicand social consequences of the conflicts in Ukraine and the Middle East, as well as to mitigate the effects of drought, laid down the concept of interim hydrogen backbone network operators, who, until their final designation, and by agreement of the Council of Ministers and by means of horizontal legal entities, may exercise the functions of developing the hydrogen backbone network in the field of projects of common European interest. In the exercise of these functions, the Technical Manager of the Gasista System has submitted to MITECO in April 2024 a proposal for hydrogen backbone infrastructure for Spain, with a ten-year horizon.

b) Impact of the measure

This measure will make it possible to turn Spain into the first renewable hydrogen *hub* globally, incorporating the first axes of the national backbone to connect green hydrogen production sites with domestic demand and with the two international interconnections with France and Portugal.

c) Sectors addressed

This measure targets the renewable gas sector.

d) Responsible

MITECO and CNMC within their remit.

MEASURE 4.13 LOCAL ELECTRICITY MARKETS

a) Description

Local electricity markets seek to provide flexibility solutions for the operation of the distri bution grid, which can solve one-off or persistent congestions. The theoretical operation for this type of project, defined in projects such as the IREMEL project (Integration of Energy Resources through MercaTwo Local Electricity) developed by IDAE and OMIE, replicates the functioning of the current day-ahead and intraday markets, using the price signal to encourage distributed energy resources to provide flexibility services to distribution system operators, in a competitive environment and under market conditions. Participation in these local markets would in any event be complementary to the participation that such distributed energy resources could have in existing markets and services.

Participation in the different markets would be conditioned by the situation of the network at any given point in time: in the absence of congestions, they could participate in existing markets; if there are specific congestions, local products could be created differentiated by area, while in the case of persistent congestions requiring resources with a commitment to act, both local products and ex-ante procurement by the flexibility service distributor could be envisaged.

Such markets can be a way of optimising the functioning of the electricity systemtogether with it, facilitating the penetration of distributed energy resources and transposing the Directive on the internal electricity market, which in its Article 32 promotes the definition of flexibility services as a compactalternative to the current way of managing the distribution system, based on grid reinforcements. They also offer the possibility of introducing the price signal in areas where electricity is currently not traded on day-ahead and intraday markets (e.g. islands). Such solutions are already being explored in HORIZON 2020 projects such as DRES2MARKET and OneNet.

In order to be implemented, it is necessary, inter alia, to increase the visibility that distribution system operators have of energy resources connected to the distribution system in their area of influence, as well as to increase the visibility of owners of such resources and investors of the situation of one-off and persistent congestion at distribution system level. In this respect, both energy communities and the independent aggregator, which will allow the entry of consumers who would otherwise not participate in the markets individually, will be relevant.

b) Sectors addressed

This measure concerns both distribution system operators and distri distri energy serviceholders.

c) Policy mechanisms

The development of such local markets is in line with the requirements described in Royal Decree 568/2022 of 11 July 2007 establishing the general framework of the regulatory test bed for the promotion of research and innovation in the electricity sector. In addition, in order to be implemented, circu6/2019, of 5 December, of the National Commission on Markets and Competition, establishing the methodology for calculating the remuneration for electricity distribution activity, would need to be adapted to encourage distribution system operators to be remunerated for the purchase of flexibility services, not just physical assets.

Furthermore, the 2024 Annual Legislative Plan provides for the adoption of a Royal Decree updating the regime against electricity supplyand supply with the aim of establishing a general framework for the procurement and supply of electricity, adapting the retail regulation of the electricity sector to new realities and new business models in the sector, and incorporating the regulatory aspects laid down in Directive (EU) 2019/944 of theEuropean Parliament and of the Council of 5 June 2019 on common rules for the internal market in electricity and amending Directive 2012/27/EU, corresponding to the retail electricity market and the general principles of the independent aggregator.

d) Responsible

MITECO, IDAE, CNMC, REE, Distribution System Operators.

3.5. Research, Innovation and Competitiveness dimension

R & D & I and industry should be at the heart of initiatives and approaches proposed by the national public and private sectors to respond to the challenges of national strategic sectors in specific areas that are key to knowledge transfer and the promotion of R & D & I in the Spanish business fabric. Among the six nationalsectors prioritised in EECTI 2021-2027 are Climate, Energy and Mobility and Digital, Industry, Space and Defence. In addition, EECTI's ambition to place science, technology and innovation at the service of achieving the Sustainable Development Goals, EU policy priorities and social, economicand environmental development is key in the strategic direction of state and regional funding plans and programmes.

The strategic sector 'Climate, energy and mobility' has three strategic lines addressing climate change and decarbonisation, sustainable mobility and sustainable cities and ecosystems, while the strategic sector of 'Digital, Industry, Space and Defence' has two baselines for R & D in these areas, which serve as a development of Resolution 69/266 'Global Geodetic Reference Framework for Sustainable Development' adopted by the UN General Assembly on 26 February 2015. such as the systems and networks for observing thephysical and chemical radiometers of the therrest-system with a spatial component and a surface based component (terrestrial and marine) – plus cross-cutting equipment and tools for modelling and mathematical analysis of these data, highlighting the systems and activities carried out by, inter alia, the State Meteorology Agency, the National Geographic Institute, State Ports, etc.

At national level, EECTI 2021-2027 is structured and developed through State Plans for Scientific, Scientificand Innovation Research (PEICTI), which allocate appropriate instruments to encourage, promote and finance the actionsneeded to achieve the objectives set. The PEICTI 2024-2027 defines the Strategic **Lines Programme asa cross-cutting programme** aimed at supporting priority areas of intervention, including those aimed at the energy, green, digital and industrial transition. An update of the strategic linesand their priority areas of intervention has been carried out through a participatory process involving the various actors of SECTI and taking into account the PERTE and a series of sectoral strategies and plans aimed partly or entirely at promoting research and innovation activities in their respective areas of competence.

A strong knowledge generation capital in the field of energy is available, with the above-mentioned public research organisations (OPIs), CIEMAT and CSIC, national research centres such as the National Renewable Energy Centre (CENER) and the National Hydrogen Centre (CNH2), as well as other regional research centres, universities and technology networks. In addition, in the field of energy and climate, there are a number of infrastructures that form part of the ICTS (Singu lares Technical Scientific Infrastructure) map, including in the field of energy the National Fusion Laboratory (LNF), the Al mería Solar Platform(PSA) and the Integrated Maritime Experimentation Infrastructure (MAHRIS), with nodes such as PLOCAN, iCIem, Bimep and CCOBB. In the area of climate, there are infrastructures such as the Doñana Biological Reserve, SOCIB (itssubject of coastal observation of the Balearic Islands), the Spanish Antarctic Bases and the Oceanographic FLOTA. At the same time, there are institutions for the promotion, development of specific programmes and funding for technological innovation and deployment projects, such as the Institute for Energy Diversification and Saving (IDAE) or the Renewable Energy Control Centre (ERCC) of Red Eléctrica de España (REE).

In relation to the R & I & c dimension, the NECP is aligned with the State Plan for Scientific, Technical and InvolvementResearch updated through the PEICTI 2024-2027, approved by the Council of Ministers on 7 May 2024. The PEICTI incorporates a number of regulatory and strategic developments and developments affecting the Spanish System of Science,Technology and Innovation (SECTI), both within the national and European frameworks. At national level, the amendmentof the Law on Science, through Law 17/2022 and the adoption of Organic Law 2/2023 of 22 March on the University System (LOSU) and Law 28/2022 of 21 December on the promotion of the start-up ecosystem (Startups Law), as well as the adoption of the Plan for attracting and retaining scientific and innovative talent to Spain, the Transfer and Collaboration Plan and the National Open Science Strategy (ENCA), are highlighted. At European level, the Commission adoptedthe Communication "A new ERA for Research and Innovation" and the Pact for Research and Innovation in Europe, reaffirming the policy objective of investing in R & D of 3 % of GDP and setting out the priorities of the new ERA through the ERA Policy Agenda and the New European Innovation Agenda. The 2024-2027 EIPTI also takes into account the Horizon Europe Programme and other programmes with European funds (such as the European Defence Fund(EDF), the European Rural Development Fund (EAFRD) or the Health for Europe Programme), the launch of the Recovery, Transformation and Resilience Plan (RRP) and the Cohesion Policy Legislative Package for the Multiannual Financial Framework 2021-2027, as the main funding and strategic

programming tools.

Furthermore, with regard to the environmental assessment of the NECP, the Strategic Environmental Study states that I am of a cross-cuttingstrategic nature to incorporate environmental research lines that improve theenvironmental impact of the NECP measures by encouraging joint work between the sector and universities, companies and scientific centres. In particular, in the environmental field of the NECP, R & I measures that maximise the environmental sustainability of installationswill be promoted, prioritising the minimisation of water use and reduction of land use.

With regard to energy generation from renewable sources, as part of R & D & I, two ex ante targets aredefined: increase the efficiency of the various renewable energy sources and reduce their cost. At this point, it should be pointedout that, in vstigations of these technologies, they should also be geared towards developments involving animpact on biodiversity and ecosystem services, and we therefore propose to incorporate this objective into this point.

3.5.1. Policies and measures to achieve national targets

The measures included in this section, within the framework of the principles and objectives of EECTI 2021-2027 and theEIPCTI 2024 2027, will contribute to a comprehensive and systemic response conducive to adequately achieving the offshore objectives set outin this Plan in the research and innovation dimension across the energy and climate value chain.

MICIU will be responsible for developing these measures in coordination with MITECO and other senior mini-departments withactions in R & D & I in their respective sectoral areas, together with its agencies and affiliated bodies. Inaddition, in order to avoid duplication and improve their effectiveness and efficiency, coordination with autologous communities andlocal authorities will be sought, as well as coordination with EU programmes and other international cooperation programmes.

MEASURE 5.1. STRATEGIC ACTION ON CLIMATE, ENERGY AND MOBILITY

a) Description

The EECTI 2021-2027 aims to put science, technology and innovation as key axes in achieving the Sustainable Development Goals of the 2030 Agenda, contributing to the Union's political prioritiesby aligning with its R & D & I programmes and addressing the challenges ofnational technical sectors through R & D & I, to the benefit of our country's social, economic, industrial and environmental development.

To this end, EECTI defines a number of **strategic lines** in priority sectors and major traversing projects, including **Climate, Energy and Mobility**. These strategic lines are developed in the PEICTI through programmatic actions channelling sectoral policies into priority areas of intervention within the strategic lines and constituting the areas of state smart specialisation.

The PEICTI 2024-2027 maintains the momentum for R & D & I in the priority areas of intervention embedded in the strategic lines, through instruments aimed at solving strategic challenges and priorities. Asimis, the strategic lines and their priority areas of intervention are reviewed and updated taking into account the thematic focus of PERTE (see measure 5.12), as well as other sectoral plans and strategies put in place.

In particular, in the **energy and mobility** framework, the following strategic lines and their respective priority areas of intervention have been identified:

- **Energy transition and decarbonisation**: Renewable energy for thermal and electrical use and storage; Fusion energy; Nuclear safety and waste management; Technologies for the production, distribution and use of new energy carriers; Advanced biofuels, synthetic fuels and renewable hydrogen; Carbon capture, storage and use and its recovery; Smart grids for advanced renewable energy management; Sustainability of energy technologies; Energy efficiency.

- **Smart and sustainable**mobility: Electric and connected vehicle; Aeronautical and naval technologies; Aeronautical and naval systems and infrastructures; Smart and advanced manufacturing; Smart and sustainable road and rail, air and maritime land transport systems and infrastructure; Transport safety, advanced monitoring and early warning systems.
- **Smart and sustainable cities and ecosystems**: Urban planning, architecture and engineering; Sustainable construction; Energy efficiency in buildings and urban environment; Urbanism, infrastructure and ecological ecosystems.
- **Just and inclusive energy transition**: Territorial development and sustainability and green transition.

PECTI also identifies priority areas of intervention related to **environment, climate and air quality**, **biodiversity** and **natural resources and environments**. In addition, **industrialtransition** is established as a technical line, including **industrial decarbonisation and energy efficiency**, the **circular economy**, **eco-innovation** and **raw materials** as priority areas of intervention.

b) Objectives addressed

Enabling available resources to achieve maximum cross-sector penetration, fostering growth, will call for improved competitiveness and impact in strategic areas for the country, includingeyegy, climate and sustainable mobility.

Contribute to the energy, climate and mobility objectives of both state and regional smart specialisation strategies, avoiding duplication and fostering knowledge exchange between the various actors involved.

Support industrial transition by facilitating the empowerment of HR, diversification of the economy, encouragement and technological improvement of SMEs interested in promoting technological change towards a low-carbon economy.

Increase returns of European energy and climate change programmes, through the alignment of national schemeswith the strategic lines set by the EU.

c) Policy mechanisms

The SECTI governance mechanisms will ensure that priority areas of intervention are monitored and updated within the strategic lines, in particular those relating to energy and climate.

The actions promoting R & D & I in the strategic lines and their priority intervention areas are distributed across the different vertical programmes and sub-programmes of the PEICTI 2024-2027, targeting HR, Investorand Experimental Development, Transfer and Collaboration, Innovation and R & D & I Infrastructure and are aligned with the different related sectoral strategies and plans.

In particular, actions in the field of energy and mobility will be aligned with the measures set out in this Plan, as well as the Long-Term Decarbonisation Strategy (EDPL) 2050, the PNACC 2021-2030, the Just Transition Strategy, the Sustainable and Connected Safe Mobility Strategy 2030, the Spanish Urban Agenda, the CircularEconomy Traveller 2030 and other strategies and roadmaps linked to the energy transition. these include the Renewable Hydrogen Roadmap, the Self-Consumption Roadmap, the Roadmap for the Development of Marine Wind and Marine Energy in Spain, the Biogas Roadmap and theEnergy Storage Strategy. Coordination and complementarity will be sought with other strategic lines related to cross-cutting technologies with potential applications in the energy transition, such as the measures set out in the National Green Algorites Programme as part of the promotion of artificial intelligence.

Spanish strategic priorities, in particular energy and climate, will be taken into account in the definition of specific aid instruments, such as those aimed at promoting knowledge transfer and collaboration, such as CDTI programmes for missions in Science and Innovation and Transmissions (the latter in collaboration with the REA), CERVERA aid and innovation ecosystems or programmes aimed at coordinatingregional R & D & I cities such as the Complementary Plans with ACs.

d) Responsible

MICIU, in collaboration with other related ministerial departments.

MEASURE 5.2. IMPLEMENTATION OF SET-PLAN

a) Description

The European Strategic Energy Technologies Plan, SET-Plan, aims to accelerate the development and deployment of clean, cost-efficient and low-carbontechnologies109 to achieve Europe's energy policy goals. Established in 2007, since 2015, it has played a central role in the implementation of the research, innovation and competitiveness dimension of the Energy Union as the key instrument to promote cooperation in R & D & I between SET-Plan countries, womendams and EU energy research institutions. The SET-Plan has a structuring effect on joint R & I actions, helping to achieve common objectives faster and more effectively.

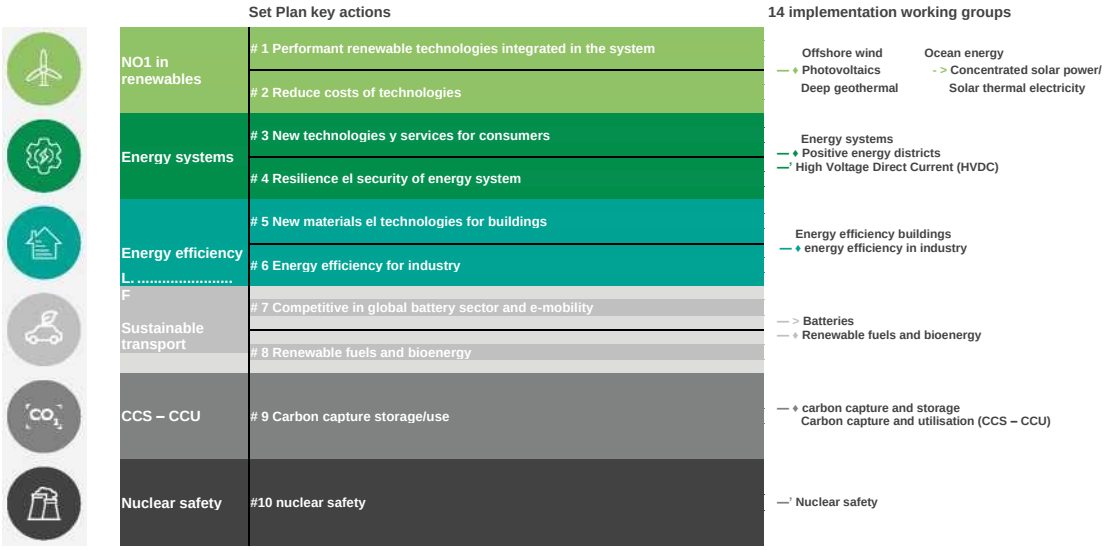
Under the SET-Plan, MICIU and its subordinate bodies CIEMAT and CDTI, in coordination with MITECO, work in groups that address the R & I & C needs of the different technologies included in the energy sector.

The activities of the SET-Plan are grouped into six R & I & c priority actions, which are broken down into ten actions covering the whole innovation chain, from research to market uptake of developments, also addressing both financial and regulatory frameworks. These actions are implemented by 14 working groups known as110 IWG *Implementation Working Groups*, one per keytechno-logy, with the task of defining R & I & C targets for each of them and implementation plans to achieve them. Spain participates in almost all IWGs and leads the concentration solar industry.

109 To this end, strategic actions and priorities have been identified to accelerate the transformation of the energy system in an effective way, identifying duplications and synergies at European and national level, coordinating national and European efforts in researchand finalising projects. We understand the SET-Plan as a roadmap for coordinated research towards the development of a portfolio of low-carbon, clean, efficient, affordable technologies and their large-scale market penetration.

The implementation**110** groups define implementation plans that include the specific R & D & I actions needed to achieve the fixedtargets, and non-technological actions, which include the funding and mechanisms necessary for their implementation. This process is led by the countries participating in the EETS Plan, in close cooperation with the European Commission and with a very active role on the part of research organisations and industry.

The European Strategic Energy Technology Plan



The SET-Plan has undergone a review process to align its objectives, not only with those of the European Green Deal (one of the Commission's six priorities for the period 2019-24), but also with theEuropean energy policy contex, reinforced after Russia's invasion of Ukraine. The revised SET-Plan Communication was adopted on 20 October 2023, contributing to align the strategic objectivesof the SET-Plan with those of the European Green Deal, the REPowerEU Plan and the *Green Deal Industrial Plan*, in particular the *Net-Zero Industry Act* and the *Critical Raw Materials Act*. This new political context underlines theunwillingness to increase the resilience, autonomy and competitiveness of the European energy system and its supply chains.

In this regard, the six priorities of the Research, Innovation and Competitiveness dimension of the SET-Plan have been revised, setting out the different objectives to be achieved and activities to be carried out:

1) **Becoming world number one in renewables**

Enable the EU to become a global leader in the development of innovative replaceable energytechnologies and increase the EU's manufacturing capacity for clean energy technologies. To this end, the SET-Plan:

- Expand its activities to include onshore wind and low perature(less than 125 °C) and medium (125-225 °C) geothermal technologies
- Establish a new IWG on hydrogen to implement the strategic R & I agenda of the European Research Area (ERA) pilot on green hydrogen
- Build on the work of the SET-Plan IWG on PV and concentrated solar energy to achieve a joint strategic R & I agenda on solar energy (PV, concentratedand non-concentrated thermal solar)

2) **Delivering a smart, consumer-centric energy system**

Accelerate the development of innovative and flexible solutions to optimise the existing grid, in particular demand response and energy storage, by increasing the share of renewable electricity integrated into the grid. It will accelerate the development and use of innovative technologies that contribute tosecurity, stability and resilience to the electricity system. At local level, the new solutions will help cities accelerate their green and digital transformation and in addition the scope of the SET-Plan will be expanded to cover low and medium voltage DC technologies (LVDC and MVDC), and harnessing low voltage micro-current networks.

3) **Develop and strengthen energy-efficient systems**

The revised SET-Plan will develop innovative and cost-effective ways to help double the annual renovation rate of buildings between 2020 and 2030 and make all new and existing buildingsrespectively zero-emission by 2030 and 2050. Its R & I priorities will also help reduce greenhouse gas emissions from industry and increase the use of renewable energy in the industrial sector. To this end, the SET-Plan:

- Expand the scope of the IWG on energy efficiency in buildings to give more prominence to heat pumps
- Expand the scope of the IWG on energy efficiency in industry and acceleratethe development, gauging, testing and validation of key technologies for energy intensive, competitive and climate-neutral industries by 2030

4) **Diversify and strengthen energy options for sustainable transport**

The revised SET-Plan will facilitate the development and uptake of 100 % renewable, efficient and interconnected energy and transport systems.

Strengthen the European battery manufacturing value chain, including domestic sourcing of rawmats and advanced materials, continue to work with the Batteries Europe Technology and Innovation Platform to support the battery value chain as well as reuse and recyclability to achieve self-sufficiency. It will address innovative storage technologies beyond electrochemical batteries.

5) **Driving ambition in carbon capture, utilisation and storage**

The revised SET-Plan will align the objectives and activities with the new energy and climate policy landscape (*Net-Zero Industry Act*, the industrial pillar *of the Sustainable Carbon Cycles Communication*, as well as the upcoming EU Strategy for Coal Capture, Utilisation and Storage (CCUS). Support public-privateactions to develop business cases and cooperation models for emerging carboncapture, storage or use value chains.

6) **Maintain and strengthen safety in the use of nuclear energy**

The revised SET-Plan will help maintain and strengthen nuclear energy, taking into account the stated ambitionof 14 Member States (Nuclear Alliance) to provide up to 150 GW of electricity capacity by 2 050 in the EU. This will involve the construction of at least 30-45 large reactors and small dularreactors (SMR). Greater emphasis will be placed on the security of SMRs, the diversification of the supply chain, industrial centres and the promotion of the development of centres of excellence, skills and availability of world-class research infrastructures.

In addition to these priorities, the revised SET-Plan envisages **addressing cross-cutting issues**: digitalisation, circularity and material efficiency, societal needs, upgrading and retraining of the workforce, improving access to finance, including for scaling up innovations and accelerating market uptake

b) Objectives addressed

Follow the activities of the SET-Plan working groups in which Spain is currently involved, developinga common research strategy and facilitating cooperation mechanisms between the EETSPlan countries with the European Commission, such as the co-funded European partnerships (CET and DUT).

c) Policy mechanisms

Facilitating the implementation of specific actions to contribute to the objectives of the revised SET-Plan, as well as considering in the IWG Implementation Plans actions addressing cross-cutting issues, analysetheir impact on the different technologies.

The EECTI 2021-2027 includes a Strategic Action on Climate, Energy and Mobility which provides the necessary flexibility to facilitate international collaboration and implementation of the SET-Plan lines.

d) Responsible

MICIU, through S.G. Innovation and CDTI, coordinated with MITECO.

MEASURE 5.3. COMPLEMENTARY ENERGY AND CLIMATE PLANS

a) Description

As indicated in various internal and external analyses (including the reports of the European Commission and the Country Comendations), there is a need for greater coordination between the national and regional levels in the development, implementation and evaluation of R & D & I policies in order to avoid duplication and improve their effectiveness and efficiency. For this reason, the 2021-2024 PEICTI provided for the possibility of approving additional plans to develop the plansreferred to in its various priority axes, as well as those considered strategic in the field of R & D & I policy, and those Autonomous Communities andpublic bodies of the Spanish Science, Technology and Innovation System that participate in its funding could be included in the implementation of those plans, allowing the various objectives to be deepened and developed. beyond the specific conceptual framework of the respective plans, measures to improve public R & D & I policies, creating new scenarios for inter-administrative cooperation and thus allowing the State and the Autonomous Communities to approach new avenues for cooperation in the field of science, technology and innovation.

In addition, Article 42.6 of the Law on Science includes the provision that State Plans may include supplementary plans, giving it the status of a law.

b) Objectives addressed

- Promote coordination between state and regional public administrations by establishing concrete mechanisms for cooperation between the various administrations.
- Avoid duplication and improve effectiveness and efficiency in the design, implementation and evaluation of R & D & I policies.
- Align with the most advanced co-management measures put in place by the EU, such as partnerships or partnerships between Member States and their regions.
- Promote coordination of regional R & D & I capacities in regional and state strategic areas defined in smart specialisation strategies.

c) Policy mechanisms

The **Supplementary Plans with the ACs** are a new instrument for establishing partnerships with the ACs on R & D & I actions where common priorities of regional and state smart specialisation strategies coincide, and which allow synergies to be established, increasing the effectiveness of public policies in certain strategic areas. These plans, which are part of component 17 of the PRTR, are jointly funded and allowfor close implementation of funds. In this regard, following an initial phase of presentation of expressions of interest by the ACs, the first four supplementary plans[111] in the areas of biotechnology appliedto health, Quantum Communication, Energy and Renewable Hydrogen and Marine Sciences were signed in 2021, followed by otherssigned in 2 022 in the fields of Agri-Food, Astrophysics and Physics of High Energy, Advanced Materials and Biodiversity. In addition, in 2022, new projects were incorporated into each of the eight supplementary plans. Together, they are mobilising EUR 466 million until the end of 2025, of which 36 % is financed by the ACs, with an amount of EUR 167 million.

Specifically, ten ACs are involved in the **Renewable Hydrogen and Energy Plan**. Aragon, the Principality of Asturias, the Canary Islands, Cantabria, Castile-Leon, Castile-La Mancha, the Community of Madrid, Extremadura, Navarre and the Basque Country) and the CSIC. With a total investment of EUR 92 billion, the plan is geared towardsshifting strategic hydrogen-based actions to

[111] The direct award of grants to the ACs to finance the implementation of the eight programmes for the implementation of thecompel plans is regulated by Royal Decree 991/2021 , Royal Decree 287/2022 and Royal Decree 633/2022.

transform the current energy paradigm and minimise greenhouse gas emissions. In particular, the parties have expressed their willingness to identify, where appropriate, as areas of future collaboration for the development of the programme, the following lines of action (LA):

- LA-1: Generation of green hydrogen at low temperature from renewable energy.
- LA-2: Low temperature green hydrogen generation from off-shore wind power.
- LA-3: High temperature hydrogen generation from renewable energy and using residual heat.
- LA-4: Generation of hydrogen and biomethane from biomass.
- LA-5: Generation of biofuels from hydrogen and CO_2.
- LA-6: Development of systems for pressurised storage and supply of green hydrogen.
- LA-7: Hydrogen uses in heavy-duty transport, aviation and maritime.
- LA-8: Hydrogen uses in the combustion industry.
- LA-9: Hydrogen uses in the industrial and domestic sector using fuel cells.
- LA-10: Use of hydrogen in the industrial sector for reducing CO_2 emissions and as a chemical agent.
- LA-11: Technical and economic studies and market launch of utility models. Dissemination, training and capacity-building activities for new researchers.
- LA-12: Overall coordination of the project.
- LA-13: Launch of the National Research Centre for Energy Storage.

The CSIC, for its part, will give impetus to the Interdisciplinary Renewable Energy Platform (TIP112 TransEner +). This platform groups its activities into five strategic areas in which the various most relevant initiatives or projects are integrated into: renewable generation, efficient energy storage, industrial decarbonisation,hydrogen technologies and electrification.

In addition to the specific lines mentioned in the Renewable Hydrogen and Energy Plan, other typesof action linked to energy efficiency and climate change are included in other supplementary plans, particularly in the areas of marine science, agri-food, advanced materials and biodiversity.

These complementary plans have also been included as one of the tools needed to promote the R & D phase of PERTE ERHA. This issue consolidates the necessary synergies between the deployment of decarbonisation technologies and the R & D oriented phase.

In the implementation of the supplementary plans, the ACs may organise various initiatives such as thosefor R & D & I projects. In these calls, the participation of companies may be possible, always by means ofcompetitive tendering procedures.

The 2024-2027 PEICTI provides for the further development of supplementary R & D & I plans, as a coordination and co-governance tool for the programming of the AGE and the ACs, enablingstrategic partnerships to be established, through multiannual R & D & I programmes in priority scientific and technical areas at national and regional level. An evaluation of the Supplementary Plans convened in the 2021-2023 PEICTI is planned to allow the design of the Supplementary Plans for the period 2024-2 027 in order to mobilise funding in a more synergistic and flexible way.

112 TIPs are interdisciplinary collaboration initiatives that encourage a participatory process in achieving missions that seek to reach out to businesses and have marketing prospects.

d) Responsible

MICIU, through the Research Subdirectorate and the CSIC, in coordination with the Autonomous Communities.

MEASURE 5.4. SCIENTIFIC AND TECHNICAL INFRASTRUCTURES IN THE ENERGY AND CLIMATE SECTORS

a) Description

The term 'single scientific and technical infrastructure' (ICTS) refers to end-of-life facilities, resources or servicesto develop cutting-edge and top-quality research, as well as for the transmission, exchange and preservation of knowledge, technology transfer and the promotion of innovation. They are unique or exceptional, with a very high cost of investment, maintenance and operation, and the importance and technical nature of whichjustifies their availability for the entire group of R & D & I. ICTS are located throughout the national territory and are included in what is known as the **Mapa of Syngular Scientific and Technical Infrastructures**.

In the energy and climate sectors, several ICTS are listed in the Mapa of Singular Technical Science Infrastructures:

- ENERGY Platform Solar de Almería (PSA), National Fusion Laboratory (LNF) and Integrated Maritime Experimentation Infrastructure (MAHRIS), in particular its nodes PLOCAN (Plataforma Oceánica de Canarias), iCIem (Maritime Experimentation Laboratory of the UOC), Bimep (Platform for Maritime Energy of Biscay) and CCOBB (Maritime Infrastructure of the Institute of Environmental Hydrauty of Cantabria)
- CLIMATE: Doñana Biological Reserve, SOCIB (Balearic Islands Coastal Observation System), Spanish Antarctic Bases, Oceanographic FLOTA and PLOCAN.

Spain also participates in numerous international research infrastructures, which are a basic pillar for advancing science and an essential tool to address the major issues raised by society. They are excellent examples of European and international cohesion as they are created as *Joint Ventures*, in which their partners, Member States and Associates, decide to participate in them according to their national priorities in a variable geometry scheme. This is because the cost of building and operating these large infrastructures makes it impracticable that they can be addressed or financed by a single country. They therefore have an international dimension, resulting from a long-term commitment from countries that decide to work together at different stages of their development.

In particular, the **European Strategy Forum on Research Infrastructures (ESFRI)** is created with the aim of developing a common approach to European policies on research infrastructures, which are considered a key element in the construction of the European Research Area. The 2021 Roadmap, currently in force, consists of 22 'ESFRI projects', of particular European relevance, as well as 41 'ES- FRI *Landmarks*', infrastructures already implemented and offering services to researchers or in the last stages of implementation, covering all scientific domains. Spain participates in a large number of them (some of them have their headquarters in Spain, while others considered to be distributed also have nodes in our national territory). In particular, in the areas of Energy and Climate, the following are noteworthy:

- ENERGY EU-SOLARIS, IFMIF-DONES (both led by Spain) and others as well as MARINERG-i (distributed, with nodes located at different points in the national geography)
- CLIMATE: LifeWatch (headquartered in Spain), and others such as ICOS or ACTRIS (with nodes distributed in the national geography)

At the same time, it is crucial to promote the development of infrastructuresthat facilitate experimentation through the adoption of emerging technologies such as *living labs*, *testbeds* or *Digital Innovation Hubs (DIH)*.

b) Objectives addressed

Boost R & D & I in the energy and climate sectors supported by the specialised ICTS in Spain, ESFRI research infrastructures whose main headquarters or nodes (if distributed) are located in Spain, as well as research centres specialised in those sectors.

Promoting access to and use of R & D & I infrastructure in the field of energy and climate by both national and European SECTI

actors, as well as increasing the interest and participation of the sectorin these infrastructures.

c) Policy mechanisms

EECTI 2021-2027 provides for the updating and implementation of the ICTS Map, in coordination between the State and the ACs, which will serve as a driving force for boosting excellence. Strengthening ICTS cons is oneof the key elements of the Strategy and will promote regional coordination and the cohesion of SECTI with the EU.

Furthermore, EECTI 2021-2027 states that opening up major European research infrastructures is essential for the advancement of world-leading science and technology and represents a major international collaborative effort.

Funding established annually through nominations in the General State Budget.

The PRTR includes a measure in Component 17 I.02 for strengthening the capacities, infrastructure and equipment of the national system of science, technology and innovation, aimed at the enovation oflargenational infrastructures, as well as new actions in large European and in-house researchinfrastructures, enabling funding from the *Next Generation* EU European Recovery Fund to be channelled.

It is also worth highlighting funding through Spain's Multiregional Operational Programme, both for the 2014-2020 operational period and the following 2021-2027, aimed at both ICTS and the participation ofEuropean research infrastructures, in particular those associated with the fields of energy and climate.

In addition, the CDTI is working to support Spanish industry, contributing to the creation, development and provision of equipment for ICTS by supporting its R & D projects for the development of its technological capabilities and the achievement of industrial and technological returns of the GICS in whichSpain works, including ITER in the field of energy and climate.

d) Responsible

MICIU, via the Secretariat-General for Research.

MEASURE 5.5. PUBLIC PROCUREMENT OF INNOVATIVE TECHNOLOGY (CPTI) AND PRE-COMMERCIAL TECHNOLOGY (PPP)

a) Description

The amendment of the Law on Science (Article 36 e) promotes the development of actions to **purchase innovative goods or servicesthat** do not currently exist on the market as a final product or service, or research into solutions to future public needs. The resulting technologies must be included in the EECTI priority lines or the national and regional plans that develop it. Public Purchase of Innovation (PPI) can take the form of Public Procurement of Innovative Technology (CPTI) or Pre-Commercial Public Purchase (PPP).

CPTI consists of the purchase of an innovative good or service that at the time of procurement is very singing tothe market, and involves additional technological development to adapt the product or service to the needs of the buyer. It is fully subject to Law 9/2017 of 8 November 2003 on Public Sector Contracts (LCSP). In the environmental field, the LCSP makes it possible to require environmental management certificates from tendering companies, as a condition of technical solvency, i.e. to prove the experience or 'know-how' of that company in the field of environmental protection. In addition, the Act creates a new procedure aimed at encouraging public procurement of innovation: the 'association fornovation' procedure. The science law encourages the use of this procedure in calls for tender leading to CPTI procedures.

PPP is a tool to foster innovation from the public sector, through procurement of research and development (R & D)defects, aimed at achieving a new or significantly improved product or service. It makes it possible to overcome the technological risks of R & D associated with possible alternative solutions by separating R & D from the subsequent acquisition of commercial volumes. These initiatives cover up to obtaining validated prototypes in a more or less extensive real environment.

EECTI 2021-2027 includes these instruments as measures to promote systemic innovation, turning public administrations (AGE,

ACs, local authorities, public enterprises, universities, etc.) intodriving blocks for innovative activity and states that specific PPI lines will be implemented in relevant areas according to identified public needs.

These initiatives will therefore be able to finance the development of innovative products or services in the field of energy, climate and sustainable mobility to be procured by public sector buyers.

b) Objectives addressed

- The improvement of public services and infrastructure, by incorporating innovative goods or services, meeting duly identified and justified public needs, under environmental protection criteria;
- Economic dynamism, internationalisation and competitiveness of innovative enterprises, with a particular focus on priority policy areas such as energy and climate
- Boosting knowledge transfer and application of research results, and generating launch markets for new technology-based companies
- Short, medium or long term cost savings
- Experimentation in public policy design

c) Policy mechanisms

The mechanisms to promote public-private partnerships in the 2024-2027 PEICTI include the following instruments:

- CPP, managed by CDTI
- the CPI-FID Line managed by the Secretariat-General for Innovation, which co-finances IPC actions from ERDF funds

In addition, the European Commission, through the framework programme, supports the preparation and implementation of joint cross-border CPTI and PPPs.

In component 17 of the PRTR (C17.I3), PPPs are targeted at areas where Spanish entities have been ableto move quickly to the real environment with high potential technological specificities, such as green energy and its hybridisation with future and high-scalability energy carriers, and where euro capacity isclearly improved or Spanish public-private knowledge shows significant advances, such as biodegradable batteries, high-efficiency submarine systems, etc.

d) Responsible

MICIU, through the Secretariat-General for Innovation and CDTI.

MEASURE 5.6. STRENGTHENING PUBLIC VENTURE CAPITAL FOR TECHNOLOGY TRANSFER IN ENERGY AND CLIMATE

a) Description

Public venture capital is a financing instrument that facilitates the development and growth of enterprises on the basis of new technological developments. This is why it is appropriate to promote solutions to energyand climate challenges.

Law 28/2022 on the promotion of the start-up ecosystem regulates the tax classification of the retri butionobtained by the successful management of venture capital entities (known as ‘carved *interest*’), while establishing a specific tax treatment for such remuneration, in line with the regulation of countries with no otherenvironment, encouraging the development of venture capital as a channel for business financing of particular importance, all with the aim of boosting entrepreneurship, innovation and economic activity.

b) Objectives addressed

- Attracting venture capital to innovative companies with high growth potential in strategic sectors of the Spanish economy such as energy and climate.
- Increase the volume of venture capital sector actions to promote specialisation in emerging technology areas and geographical diversification.
- Connecting public research with long-term venture capital, so that clean energy research and innovation can access the market faster and more effectively.
- Promote business innovation by supporting venture capital investment in technology-based or innovative enterprises, encouraging the creation of a specialised ecosystem covering the financing of the different stages of companies' life cycle and supporting their needs in terms of management, technology knowledge and access to international leaders.
- Promote the development and consolidation of venture capital in Spain at all stages, including capital seed and *equity funds*, through the creation of public or private public funds and direct public/private co-investment in technology companies.
- Enhance technology transfer from public research institutions to civil society.

c) Policy mechanisms

The **Public Risk Capital Society – Innvierte Society** will launch two new funds to foster the development of entrepreneurial innovation and entrepreneurship:

- Investment Fund: the Innvierte Company will participate in the capital of innovative companies with disruptive technologies.
- Technology Transfer Fund: it will be specialised in investing in science and technology based companies at an early stage, encouraging the transfer of scientific knowledge to the productive fabric.

Furthermore, as indicated in its Strategic Plan IDAE 2022-2026, IDAE, which already has a portfolio of around 25 projects in the field of energy transition, from wind farms to renewable hydrogen production projects, to demand aggregation platforms, aims to position itself as an even more relevantinvestor in the energy transition process. To this end, IDAE has drawn up an Investment Strategy 2024-2026, which includes, inter alia, a wide range of instruments, ranging from direct participation in the capital of companies to channelling resources through investment funds.

In line with initiatives at European level, Spain will test new funding approaches to support high-risk and high-impact clean energy innovation (such as Priori Technology Initiatives, FOAK –*first of a kind*projects, etc.) to foster entrepreneurship and market uptake of innovative and energy-efficient low-carbon solutions.

d) Responsible

MICIU, via CDTI; MITECO through IDAE.

MEASURE 5.7. REGULATORY AMENDMENTS TO FACILITATE RESEARCH AND INNOVATION

a) Description

Research and innovation often face challenges to overcome in order to achieve optimal development. Some of the most relevant ones, either of a general nature or of a particular nature inthe field of energy and climate, are listed below:

- **Boosting the transfer of knowledge and research results**, which requires improvement: (1) flexibility for public bodies to establish stable links and partnerships with businesses; (2) the agility for the creation of new businesses to bring research results

to the market and for the participation of research staff; (3) processing times for agreements; (4) public-private partnership mechanisms.

- **Facilitate the development of tests and models** to support the assessment of the usefulness of amending the regulatory framework in order to adapt it to new needs.
- **Speed up red tape and reduce administrative burdens** for the financing and implementation of R & D & I projects, which slow down their implementation and do not adapt to the speed of changes in the fields related to climate change, energy, biodiversity and green economy and jobs.
- **Attracting and retaining research talent**, as research staff requires more flexibility in their contractual relations with public bodies, as well as a special focus on their professional development.

In the framework of the PRTR, Spain is carrying out major institutional reforms aimed at strengtheningSECTI's pacities in order to improve its effectiveness, coordination, governance and knowledge transfer. It should be noted that **the Law on Science, Technology and Innovation (LCTI) was amended** by **Law 17/2022** pu on 5 September 2022,the reform of which seeks to address the major shortcomings identified, the three main axes of which are: (1**) improve the governance and coordination** of SECTI; (2) achieving an **attractive and stable scientific career**, allowing scientific talent to be retained; (3**) strengthen the transfer** of the results of theintrusive activity to society.

To accompany the reform of the LCTI, the **Plan for attracting and retaining talent 100 temper and innovativefor Spain** has been approved. In addition, in compliance with the OECD Roadmap for Improving Knowledge Transfaith in Spain, aKnowledge **Transfer and Collaboration Plan** has been drawn up with the aim of strengthening links between the public and private sectors in R & D & I, in order to increase the economic impactof public investment in research and boost the innovative capacity of Spanish companies.

In addition, the amendment to the LCTI introduces provisions for regulatory testbeds or *sandboxes* to enable the implementation of R & D & I pilot projects and measures to facilitate the procedures for granting and justifying aid. It also simplifies the processing of agreements for R & D & I and promotes the adoption of measures to reduce administrative burdens.

Furthermore, the recently adopted **Organic Law 2/2023 of 22 March 2007 on the University System** introducesamendments concerning the research and transfer function in universities, with a view to mentoringinterdisciplinary and multidisciplinary research and networking, as well as the creation and participation in knowledge-based companies among other relevant issues.

Law 28/2022, of 21 December, on fostering the start-up ecosystem incorporates a number of administrative, fiscal and pay measures aimed at facilitating the creation and growth of innovative knowledge-baseddams (*start-ups*), attracting and securing talentand investing. Its policy framework includes technology-based or science-based companies, including companies based on disruptive energy and climate-related technologies. In addition, public-private partnerships and the creation of innovative start-ups in the university environment are encouraged and *regulatory sandboxes are regulated*.

In the field of energy, as set out in measure 5.18, Royal Decree 568/2022 was approved on 11 July 2022, which establishes the general framework for the regulatory test bed for the promotion of research and innovationin the electricity sector[113]. These regulatory *sandboxes* are a key element in providing controlled environments to test new products and services, thus facilitating the adaptation of the regulatory framework to respond to the new context marked by a more dynamic, decentralised, clean, sustainable electricity sector that places citizens at the centre. Its implementation is of particular relevance both in the area of energy storage, as well as for aggregation, demand management and flexibility services and new business models in the energy transition.

Law 7/2021 on Climate Change and Energy Transition also foresees in its eighth additional provision the need to encourage and regulate the use of testing facilities as a regulatory sandbox to conduct pilot research and innovation projects in onshore and offshore renewable energy.

113 Implementing the 23 rd additional provision of Law 24/2013 of 26 December 1997 on the Electricity Sector on Regulatory Evidence Banks, introduced by Royal Decree-Law 23/2020 of 23 June 2007.

In addition, and in compliance with the eighth final provision of the LCCTE, the draft Sustainable Mobility Act, which regulates regulatory sandboxes or regulatory sandboxes for transport and mobility, is being processed, aimed at regulatory innovation.

b) Objectives addressed

- Consolidate a robust knowledge generation and transfer system to address major challenges such as the green and just transition, digitalisation or the demographic challenge.
- Foster the uptake of talent in organisations and entities in the field of R & D & I in energy and climate, by enabling the best researchers and technologists to integrate and consolidate their careers, in a context of budgetary and financial stability and to be able to focus their efforts on achieving R & D & I objectives.
- Foster generational renewal by fostering scientific and technological vocations, offering opportunities for young talents and stimulating STEM education from early educational stages with an inclusive approach that fosters diversity and quality education.
- Incorporating research staff in the business and industrial sector, encouraging mobility from enterprises to science and technology and vice versa, and promoting the absorption capacity of research staff in the business fabric.
- Provide the administration with greater flexibility in the processing of agreements and simplify the administrative burden in applying for, processing and granting of aid.
- Have in place regulated research and innovation spaces to test potential regulatory improvements in targeted environments with the aim of developing new and updating existing standards, applying best practices and translating verified developments in the experimental environment into the regulatory framework.

c) Policy mechanisms

- Implementation and monitoring of the LCTI regulatory measures to attract and retain talent, including the design of the evaluation and accreditation system to establish an entry pathway *(Tenure Track)* and flexible recruitment mechanisms in the public sector.
- Promote pre-doctoral and post-doctoral recruitment through competitive calls and the integration of research staff in the private sector. It should be noted that, from the 2021-2023 PEICTI, it incorporates the possibility of associating grants for the recruitment of research staff in companies (industrial doctoral staff and Torres Quevedo) with other instruments aimed at promoting transfer and collaboration, such as Public Private Partnerships (EIP) and Cervera Transfer Projects (CDTI).
- Work will be carried out on measures to make aid management more flexible and simpler as a cross-cutting line of action.
- The creation and growth of new technology companies will be facilitated by simplifying administrative procedures for their creation, improving social benefits, through targeted calls for support (such as Neotec) and developing mechanisms to facilitate capital investment.
- Specific calls will facilitate access and promote the participation of projects in regulatory sandboxes or *sandboxes*.

d) Responsible

MICIU; MITECO; MINECO.

MEASURE 5.8. PROMOTION OF PLABLICO-PRIVADA COLLABORATION

a) Description

Public-private partnerships and transfer are critical to increase the innovative entrepreneurial effort and enable companies, and more

particularly SMEs, to have a wider base with the multidisciplinary knowledgeneeded to address large or high research and technological intensity projects to respond to societal challenges, including the energy and environmental transition.

The amendment of the Science Act strengthens this aspect and promotes the interrelationship of actors, as well as cooperation between the different areas of knowledge and the training of transdisciplinary teams. The Law states thatknowledge transfer must take place in both directions, enriching and improving the productive and business fabric, but also generating public benefits and advantages for society as a whole.

In this line, one of the priority axes of EECTI 2021-2027 is to promote public-private partnerships. Both the PEICTI and the PRTR provide for lines geared towards public-private collaboration to boost research in strategic lines, through collaborative projects, promoting the creation of networks and/or the role of intermediary bodies, including technology centres.

b) Objectives addressed

- Strengthen knowledge transfer and management in open and flexible R & D & I collaborative environments where interaction, dissemination of ideas and adoption of shared goals and models favours the development of new ideas and their translation into technological applications.
- Promote the role of intermediary bodies, in particular Technology Centres (CCTT) and Technology Innovation Support Centres (Cait), as enabling means of knowledge transfer between the public and private spheres and foster collaboration between them.

c) Policy mechanisms

- CERVERA aid, managed by the CDTI, finances three types of actions involving the CCTT and the Cait registered at State level:
  - Cervera Transfer R & D Project Programme, which funds collaborative projects between continentsand research organisations in the priority technologies CERVERA related to energy and climate114.
  - Cervera Aid programme for CCTT and Cait network clusters related to energy and climate.
  - Creation of innovation ecosystems to foster networking and stable collaboration between public and private research actors around CERVERA priority technologies to exploit sync GIASand capacities of participants in the ecosystem.
- Under the programme Missions in Science and Innovation, managed by CDTI, and Transmissions (together with the REA), tractor projects are launched in areas related to the 'green challenge'115, which are carried out in collaboration between companies with mandatory participation of research organisations.
- In addition, the CDTI, through all its programmes, supports business R & D projects in public-private cooperation, in all types of technologies, which contribute to achieving some of the energy and environmental challenges identified in the NECP.
- The EIP finances public-private partnerships through various instruments, including the Research Networks programme, targeting both thematic networks (in the areas of energy and transport, environmental science and technologies) and strategic energy and climate networks for national management and coordination of national and international strategic initiatives. Including through the PPP project programme and green transition projects116 developed in public-private partnerships, as well as Proof

114 The Cervera Network mainly focuses on the development of R & D lines grouped into 11 thematic areas. Energy and Climate are also directlyor indirectly covered by several of the proposed lines and, in particular, the 'Energy Transition' line.

The identified missions**115** include some directly or indirectly linked to energy and climate. Such as 'Strengthening technological capacities for safe and sustainable energy autonomy (fusion, hydrogen and renewables)', 'Boosting a more sustainable agri-food sector adapted to the new conditions associated with climate change through a relevant use of advanced biotechnological tools' or 'Developing application technologies in the shipbuilding sector to improve competitiveness in the 21st century'.

116 They address aspects such as decarbonisation, energy efficiency, renewable energy deployment, electrification of the economy, development of energy storage, nature-based solutions, green restoration, circular economy and improving resilience of all economic sectors.

of Concept projects117.

- Within the framework of the NACC, a programme is foreseen for networking, collaboration and coordination between research staff and the different actors in climate science and adaptation to climate change.

- In the field of sustainable mobility, a programme is planned to create networks of collaboration and coordination between the various actors in the transport and mobility innovation ecosystem, which will be managed by the State Secretariat for Transport, Mobility and the Urban Agenda.

d) Responsible

MICIU, through the EIP and CDTI; MITECO; MTRAMS.

MEASURE 5.9. RENEWABLE ENERGY CO-OWNED RESEARCH CENTRES

a) Description

As part of the collaboration between the AGE and the ACs and in order to strengthen technological development in the fieldof renewable energy, there is the possibility of setting up jointly **owned research centres,** which are at the service of the entire national scientific and technological community and open to international collaboration. This was the case with the **National Centre for Experimentation of Hydrogen and Fuel Cells Technologies (CNH2)**, created as a consortium by signing an agreement with Castile-La Mancha for its design, construction, equipment and operation. CNH2 aims at scientific and technological research in all aspects of hydrogen (generation, storage, transport, use, etc.) and fuel cells.

Another notable example is the National Renewable Energy **Centre (Centro Nacional de Energías Renovables – CENER)**, which was set up in 2000 as anot-for-profit event, with shared ownership between the AGE (through MICIU, MITECO and CIEMAT) and theGovernment of Navarre. It specialises in applied research and development of renewable energy technologies and provides technological support to energy companies and institutions in five areas: wind, solar thermal and solar photovoltaic, biomass, energy transition in cities, and energy grid integration.

In the same vein, an agreement was signed on 20 December 2021 between the AGE (through MICIU and CIEMAT) and the Government of Extremadura for the creation, equipment and implementation **of the IberianEnergy Storage Centre (CIIAE)** with the aim of stimulating the technological and scientific response to the management of renewable energy production. In 2021, a Memorandum of Understanding was also signed between the Ministry of Science, Innovation and Universities of the Kingdom of Spain and the Ministry of Science, Technology and Higher Education of the Republic of Portugal for the establishment and development of the ISAE. The IARC focuses on solving the technological and scientific challenges that enable green energy production to be managed. The centre shall carry out research in energy storage for the development of R & D & I activities providing fantastic solutions toboth the deployment of battery based energy storage technologies and the industrial applications of hydrogen and other renewable gases and the production, storage and transport of the hydrogen industry on a large scale.

Among the scientific objectives of the Centre are: (1) design, synthesis and characterisation of advanced materials for energy storage at different levels; (2) multi-scale modelling: from the atomic and molecular level of materials used for storage to processes and their integration, including advanced control andmonetisation; (3) analysis and modelling of systems, using energy carriers and storage scales. Models for the integration of the heat, energy and transport sectors and the energy carriers linking them; (4) techno-economic and environmental analysis, including the life cycle of storage equipment and processes and their integration with green energy.

Supported**117** projects should show the potential to incorporate their results into the market or to generate value in society. This aid isdesigned to promote the early stages of pre-competitive development and facilitate its practical implementation, such as the protection of knowledge generated, the analysis of technical, commercial or social viability, the acquisition of technological prototypes, the development of pilot scale, end-user testing, the definition of the business model, or the early stages of setting up a business.

The activities require the development of demonstration experimental facilities in Sayarand the validation of energy storage solutions, the purchase of scientific-technical equipment, the launch of prototypes, and the training of industry professionals in this field.

b) Objectives addressed

- Ensuring, through research and development, energy supply, increasing the contribution of renewables and emerging energy technologies, in an efficient and competitive manner and their integration into the national energy system, so that their contribution enhances security of supply, diversification of supply sources and protection of the environment.
- Strengthen the leadership of Spanish technology and competing companies, improve the energy efficiency of our economy and reduce the country's economic and geostrategic dependence.

c) Policy mechanisms

- Annual contributions from linked administrations for the annual costs of operation, maintenance, basal research and investments of centres of shared ownership, through transfers or allocation of resources from European funds, in particular from the ERDF and ESF Operational Programmes for R & D & I.
- Creation and development of the Iberian Energy Storage R & D Centre, with majority RRF funding.

d) Responsible

MICIU, through the Secretariat-General for Research and CIEMAT; MITECO; Linked Autonomous Communities.

MEASURE 5.10. PROMOTE AN INNOVATION POLE ON RENEWABLES, STORAGE AND HYDROGEN AT THE CITY OF ENERGY FOUNDATION, CIUDEN

a) Description

The City of Energy Foundation (CIUDEN) is a state public sector foundation, attached to the Institute for the Just Transition (ITJ) and attached to the State Secretariat for Energy of the Ministry for the Ecological Transition and the Demographic Challenge (MITECO). The Foundation was established in 2006.

It is an organisation under the Spanish Government to implement R & D & I programmes related to energy and the environment and to contribute to the economic development of the territories involved in the energyprocurement process. Royal Decree 365/2024 of 9 April 2015 approving the Statutes of the Fundación CIU dad de la Energía-CIUDEN, F.S.P. adapts its statutes to a new context of action, now at national level and not only in relation to the territories involved in the energy transition process in Castile and Leon.

b) Objectives addressed

Promoting Just Transition actions and promoting the economic, social and employment development of theCastile and Leon COMAR affected by the energy transition process, through research action and activities on decarbonisation, renewable energy, energy storage and efficiency, storage and green hydrogen.

c) Policy mechanisms

- Adaptation of its facilities at the Centre for the Development of Technology, located in Cubillos del Sil (León), in order to have dedicated units in energy storage and green hydrogen. This project is part of Component 10 Just Transition Strategy of the PRTR.
- ISCODEN economic and technological transformation plan so that, in line with the Just Transition Strategy (see Measure 1.25), it plays a significant role in reviving the areas of Castile and Leon affected by the energy transition, and also acts as the MITECO policy body on those issues that it considers necessary to meet the objectives in other areas.
- Development of a feasibility plan focusing on decarbonisation strategies through technological development of renewables, CO2

capture and storage systems, green hydrogen generation systems and equipment, including storage and e-fuels, as well as other cross-cutting blocks of particular importance for the deployment of such technologies, such as digitalisation, industrial cybersecurity and energy decentralisation.

- Creation and development of a green hydrogen valley to boost technologies for the production and storage of green hydrogen, as well as the development of a pilot project to promote the decarbonisation of the Cubillos railway line from Sil to Villablino, through a motor vehicle driven by green hydrogen.
- Promoting the use of renewable energies through the creation of energy communities, such as the Community Transformation Office.
- Act as the Community Transformation Office, providing advice to facilitate, assist and promote the creation of local energy communities in the province of León, through the IDAE programme.

(D) Responsible

MITECO

MEASURE 5.11. IMPROVING SECTI GOVERNANCE AND COORDINATION

a) Description

The LCTI sets out the instrumental nature **of EECTI and its development plans (PEICTI)** to achieve the sustainable R & D & I objectivesestablished in a multi-annual reference framework and the **Science, Technology and Innovation Information System (SICTI)** as a tool for data collection and analysis for data development, monitoring and evaluation.

For the first time, EECTI 2021-2027 incorporates monitoring and evaluation as intrinsic parts of the strategy itself, defining the governance model and the monitoring and evaluation system. This is a highly important differential fact that shows a new way of planning and designing R & D & I policies based on the results achieved from previous programming. To this end, there is a system of indicators and review criteria that make it possible to assess the efficiency and effectiveness of the actions taken.

At the same time, it recognises the need to strengthen coordination between national and regional levels in the design, implementation and evaluation of R & D & I policies in order to avoid duplication and seek synergies. Similarly, at national level, the necessary coordination mechanisms must be put in place betweenministerial organisations and their funding agents.

In this regard, in accordance with the provisions of EECTI 2021-2027, the **Strategy Monitoring Committee (CS-EECTI)** has been set up, in which the quadruple helix is represented: ministries, autonomous communities, scientists, technologists and innovators, funding agents under the MICIU, aswell as resenters from trade unions, business and civil society. Its main role isto carry out the annual follow-up to the Strategy, supported by the SICTI Working Group.

In parallel, and in accordance with the provisions of PEICTI 2021-2023, the PEICTI **Coordination, Monitoring and Evaluation Committee (CCSE-PEICTI) has been set up,** involving all ministries with R & D & I actions and the three state funding actors (CDTI, AEI and ISCIII). Its main functions are: drawing up the Annual Action Programme (AAP), promoting synergies and coordination between the actions of the different ministries and monitoring and evaluating the actions set out in the PEICTI. This Committee has a variable geometry which provides for the incorporation of the quadruple helix and makes it possible to set up sec orthematic working groups. With this extended geometry, the CCSE-PEICTI is the central forum for monitoring, evaluating and updating the actions of the PEICTI.

b) Objectives addressed

- Increase collaboration and coordination between public administrations to improve the design and planning of R & D & I policies

in line with regional and sectoral policies, including those related to energy and climate.

- Involve all political, social and economic actors to respond to the challenges of strategic sectors through R & D & I and to evolve the economy towards the energy and climate transition.
- Improve the monitoring of resources dedicated to R & D & I, which include monitoring actions carried out in the defined strategic areas, as well as assessing the actual impact achieved.

c) Policy mechanisms

- The monitoring and evaluation procedure established in the framework of the EECTI Committees and the EICTI will allow an analysis of the strategic lines identified as priorities in our environment, so that they can be updated in subsequent planning periods.
- Improvement of the system for collecting R & D & I actions to be integrated into the AAP, which include actions in strategic lines related to energy and mobility, and the development of spaces to improve their visibility and dissemination.
- Advanced development of SICTI, to improve the collection and processing of data, as well as its exploitation through the incorporation of artificial intelligence techniques, enabling monitoring and evaluation.

d) Responsible

MICIU in coordination with the ministerial departments with R & D & I activities and the Autonomous Communities

MEASURE 5.12. STRATEGIC PROJECTS FOR ECONOMIC RECOVERY AND TRANSFORMATION (PERTE) IN ENERGY TRANSITION

a) Description

The Spanish government's RRP, financed by the European Recovery Plan, NextGenerationEU, and in particular financed by the European Recovery and Resilience Facility, will allow Spain to mobilise an unprecedented amount of investment. The PRTR will enable structural reforms to be carried out in the coming years, through regulatory changes and investments, in order to bring about a change in the production model for the recoveryof the economy from the economic, social and health crisis triggered by the COVID-19 pandemic.

PERTE (Strategic Projects for Recovery and Economic Transformation) are strategic projects with a high capacity to carry forward for economic growth, employment and competitiveness, with a high public-private partnership component and cross-cutting across administrations. They are a permanent role created under the PRTR, designed as a mechanism for encouraging and coordinating highly priority projects, particularly complex or where there is a clear market failure, significant externalities or insufficient investment initiative or capacity by the private sector.

The RRP states that almost 40 % of investments will go to the green transition. Within the 12 RER TEsapproved for the time being, the following should be highlighted because of their direct link with the area of energy transition towards a carbon-neutral economy:

- Renewable Energy, Renewable Hydrogen and Storage PERTE (ERHA)
- PERTE for the development of the electric and connected vehicle (VEC)
- Industrial decarbonisation PERTE

These are at the same time complemented by the PERTE **aerospace** and the PERTE for the **shipbuilding industry**, which support-the use of renewable gases in maritime and air transport and the link between the shipping sector andthe deployment of offshore wind energy. They are also complemented by the **Circular Economy** PERTE (which includes among their priority sectors the reuse,

treatment and recycling of materials in the field of renewable energy, e.g. recycling the blades of wind generation installations at the end of their life or the promotion of biogas), **agro-food** (which integrates actions towards energy efficiency such as modernisation of irrigation systems with the use of renewable energy – mainly photovoltaic) and **digitalisation of the water cycle** (e.g. use of the gases generated during water treatment for the production of electricity to be used in the plant).

b) Objectives addressed

- Strengthen the value chain to respond to the energy transition with own solutions, technologies and capabilities, harnessing the human potential to generate jobs and strengthen the sector's external leadership and competitiveness.
- Contribute to the smooth and efficient management of funds and facilitate cooperation between public administrations.
- Strengthen projects that clearly contribute to the transformation of the Spanish economy, and in particular to the energy and environmental transition.
- Maintaining positioning in the production system in areas where Spain is already a leader and strengthening areas with less presence, improving the capacity to integrate new technological solutions into the productive fabric through R & D & I.
- Boost social innovation and new business models in the energy transition, as well as position Spain as a benchmark in the key technologies of the energy transition, both in renewable generation, energy storage and the production and exploitation of renewable hydrogen.

c) Policy mechanisms

Tounderpin the areas associated with the energy transition, the Spanish Government approved the PERTE ERHA, which will contribute significantly to the energy transition, and to the objectives of the NECP. The ERHA PERTE will contribute in particular to R & I & c, through its R & D and capacity-building measures.

The instruments and actions of PERTE ERHA, generally articulated throughcompetitive calls, cover the entire renewable energy value chain and its integration into end-uses, from knowledge development to commercial deployment. R & D & I actions include applied research projects, experimental development and test beds or new capacities in the R & D ecosystem; innovation projects for the development of technological, industrial and new business models, including support for new manufacturing lines or capabilities for components and integration in different sectors, public investment in technology-based enterprises (*start-ups*, *spin-offs*) or SMEs to boost their growth.

The ERHA PERTE is structured into transformative and enabling measures, which are part of PRTR components 7, 8, 9 and 17, as well as phases I "R & D" and II "Capacities and Deployment". In addition, through the PRTR aden- da, the PERTE ERHA has been reinforced by the inclusion of a new component 31 (REPowerEU) different strategic areas of the PERTE such as self-consumption, renewable hydrogen, the industrial value chain or transport networks. In total, PERTE ERHA foresees the mobilisation of EUR 11.000 billion of public investment, which is estimated to be able to mobilise EUR 17.100 billion of private investment.

The R & D phase includes applied research projects, experimental development and test beds and/or new capacities in the R & D ecosystem. Transformative measures to highlight, which willsignificantly contribute to R & I & c, within this phase include:

- Incentive for unique renewable innovation projects, including R & D in novel technologies such as floating offshore wind.
- Support for testing platforms for offshore renewables.
- Support for industrial research projects and experimental development of energy storage.
- Upskilling and strengthening R & D in renewable hydrogen.
- Grants to the Autonomous Communities to finance the implementation of four programmes for the implementation of the supplementary R & D & I plans, with a specific item for "Renewable Energy and Hydrogen".

- Improvement of the infrastructure of the Centre for Energy, Environmental and Technological Research (ICD-MAT) in renewable energy research.
- Launch of a call by the State Research Agency for projects targetinggreen transmissions and the digital transition.
- Reinforcement of the call for grants for Science and Innovation Missions of the Centre forTecnológi co Development and Innovation (CDTI), which includes a mission on “Secure, efficient and clean energy for the 21st century” with a dedicated call for projects targeting the green transition.
- Creation of an Iberian energy storage R & D centre in Extremadura.

On the other hand, phase II aims at strengthening technological, industrial and new business models, including support for new manufacturing lines, public investment in start-ups(spin-offs) or SMEs to facilitate their growth. Transformative measures that will contribute to R & I & c include:

- Strengthening productive capacities of renewable generation technologies, biogas and biomethane and hydrogen
- Support for New Business Models in the Energy Transition.
- Reinforcement of logistical adaptations and port facilities necessary for the energy transition, and in particular in relation to offshore wind.
- Capacity building for heavy hydrogen mobility.

- The Plan + SE includes as a measure the acceleration and expansion of the financial envelope of the PERTE EHRA, as well as the development of a new PERTE for the Decarbonisation of Industry, with the aim of improving competitiveness and reducing energy costs in the manufacturing sector. It is planned to support R & D projects for the technologies needed to achieve the decarbonisation of processes and products, as well as projects for innovation, deployment and demonstration of technologies in an industrial environment.
- Instruments of the PERTE VEC include:
  - integrated actions in the VEC industrial chain managed by MINTUR, including an R & D & I line and an innovation line in sustainability and energy efficiency;
  - the unique MOVES programme, managed by IDAE, to finance technology development projects and innovative experiences in electric mobility.
- The PERTE for Industrial Decarbonisation includes a comprehensive aid line for the decarbonisation of manufacturing industry, which includes among its policy areas: (1) decarbonisation of energy sources; (2) integrated energy management of industrial processes; (3) carbon capture, storage and use (CCU); (4) decarbonisation by reducing natural resources; (5) R & D & I to boost the decarbonisation of installations.
- CDTI has contributed to PERTEs related to renewable energy, sustainable mobility and the shipping industry through the Missions Programme and with specific instruments such as the Aeronautical Technology Plan (PTA) or the Sustainable Automotive Technology Plan (PTAS). In the period 2024-2027 it will continue to support these areas through Programmes such as Missions, Transmissions and Innovation Ecosystems, among others.

(D) Responsible

MITECO and its public business entity IDAE; MICIU and its subordinate bodies, through CDTI, REA and ICD-MAT; MINTUR

MEASURE 5.13. TECHNOLOGY PLATFORMS AND ALINNE ALLIANCE

a) Description

Technology Platforms are an indispensable player in promoting dialogue and public-private partnerships, and are an instrument of R & D & I policy. They are driven by the business community, are an important player in the definition of both sectoral and cross-sectoral R & D & I priorities and are a means of incorporating the various actors in the value chain. In order to meet its objectives, it is necessary to consider the convergence of technologies and knowledge and to promote collaboration between platforms.

In this way of connecting all actors in the value chain, ALINNE was created as an alliance between thepublic (administrations and knowledge generators) and private (companies and technology platforms) teens, and which is created as a tool for energy research and innovation, to bring together and kick-startefforts among all actors in the face of the main R & I & C challenges in the field of energy. It provides a forum for strategic analysis of research and innovation in key technology areas for the energy transition, including energy and enabling or enabling technologies and their technological supply chains. Its mission is to contribute to the definition and monitoring of the national strategy in the area ofinvestment and innovation in energy technologies for the energy transition, through collaboration between public and public-private actors.

ALINNE has the support and collaboration of the Spanish Energy Technology Platforms (ETPs), which provide a broad map of national capacities (Energy Efficiency, Biomass, Wind Power, Concentration Solar, Lower Temperature Solar, Photovoltaic, Geothermal, Hydrogen and Cells, Intelligent Networks, Vision Energy, Energy Storage Systems, as well as CO_2Storage and Capture).

At international level, ALINNE is the coordination and monitoring tool that articulates Spain's participation in the Global Mission Innovation initiative, which catalyses action and investment in research, developmentand demonstration to make clean energy affordable, attractive and accessible to all. It also supports the work of the relevant managing bodies to boost participation in international initiatives118 and stimulates and coordinates Spanish participation in the European Energy Research Alliance (EERA).

b) Objectives addressed

- Accelerate the development and consolidation of new sustainable energy technologies by integrating existing capacities into public centres and companies and integrating all actors in the value chain.
- Promote effective and stable public-private partnerships based on a shared agenda and aligned interests in the field of energy and the fight against climate change
- Move towards a more efficient allocation of public and private resources dedicated to R & D & I in energy, following criteria of scientific excellence and critical mass generation, at the level of research groups and centres, business initiatives, etc. to ensure their viability and competitiveness.
- Identify future segments or niches, both in the area of fundamental research and in the field of technological and business development.

c) Policy mechanisms

The creation and consolidation of Technology and Innovation Platforms will be promoted through competitive calls for support (EIP) in order to improve the technological capacity and critical competitivenessof the national production sector by carrying out knowledge-sharing, planning and dissemination activities.

CIEMAT will promote the activity of the ALINNE alliance, with a working team to maintain the operating structure, as well as

118 Especially at European level, such as: framework Programmes, SET-Plan, European Technology Platforms (ETPs), or Knowledge and Innovation Communities (KIC).

proposing and implementing initiatives of common interest, which will be sustainable through competitive funding or direct funding.

d) Responsible

MICIU, through its EIP and CIEMAT agencies

MEASURE 5.14. ENHANCING THE INTERNATIONALISATION OF SECTI ACTORS IN THE FIELD OF ENERGY AND CLIMATE

a) Description

EECTI 2021-2027 incorporates as a cross-cutting policy window **to enhance the internationalisation** of SECTI actors by: (I) promoting participation in international programmes such as Horizon Europe and its Joint Programming Initiatives; (II) international collaboration with the support of science diplomacy; (III) international cooperation for sustainable development; (IV) encouragement and participation in internationalscientific and technological facilities and infrastructures.

Similarly, the PEICTI 2024-2027, as well as the previous plans, considers that it is one of its main drivers tocontribute to the consolidationof the European Research and Innovation Area and to foster the native-nalisation of SECTI actors, encouraging international collaboration to jointly and coordinate tackling major societal challenges, including climate and energy. To this end, the 2024-2027 PEICTI shapes the promotion of internationalisation and coordination with the European Researchand Innovation Area as a cross-cutting programme that participates in vertical programmes, bearing in mind that alignment with Community policies and internationalisation are a strategic objective to be achieved in all the policy areas of the EIPTI: human resources, knowledge generation, transfer and collaboration, innovation and infrastructure.

Promoting Spanish participation in European and international programmes requires a targeted exercise to optimise the use of available resources, in accordance withour country's priorities, strengths and tereses. To this end, an **Incentivation Plan should be established, including a set of actions to promote Spanish participation and leadership in European R & D & I programmes (Horizon Europe), taking into account the objectives set out** in the relevant national and regional plans. It is also important to lead and participate in co-financed programmes, to which Spain will have to allocate own resources, seeking to align state and regional aid and its synergy with European funds, as well as theLide razgo and Spanish presence in the decision-making areas of the Community structure.

In relation to the Framework Programme, Spain has been the fourth highest level of participation in the EU andaround Horizon 2 020 in the period 2014-2020. In particular, in the field of energy and climate, Spain has been the second most involved country both in the Social Challenge 5 'Climate Action, Environment, Resource Efficiency and Raw Materials' and in Challenge 3 'Secure and efficient clean energy'.

In the current framework programme for the period 2021-2027, Horizon Europe, it has been agreed that programme actions should contribute to climate objectives with a minimum of 35 % of the overall financial envelope. Spanish participation will be encouraged in Horizon Europe programmes and in particular in those more energy and climate programmes, which are mainly focused on Cluster 5. Climate, Energy and Mobility and Cluster 6. Food, Bioeconomy, Natural Resources, Agriculture and Environment. At the level of joint programming, participation will be encouraged in European partnerships, in particular in DUT (innovative technologies and solutions for the urban transition) and CET (clean energy transition technologies), which collect technologies needed for the clean energy transition and for the urban transition, as well as in the EU Missions, in particular the Mission on Climate-Neutral and Smart Cities and the Mission on Adaptation to Climate Change. Participation in other European programmes such as the LIFE programme, the only financialcontribution of the European Union dedicated exclusively to the environment and climate action, or under the IPCEIs (*Important Projects of Common European Interest*) calls, will also be encouraged.

Beyond the European framework, the decarbonisation of energy systems is an international priority and promotes initiatives that jointly address certain aspects of the energy transition. In particular, we need to highlight the international Mission Innovation initiative

to strengthen their alliances at international level andto support the decarbonisation of the economy.

Scientific cooperation and international collaboration, including internal cooperationfor development and science diplomacy in priority policy areas, will therefore be promoted. This, in turn, creates a favourable environment for the identification of emerging scientific and technological opportunities in geographical areas outside the EU, especially in Ibero-America.

Finally, it should be borne in mind that the future Sixth Master Plan for International Cooperation will focus on the 2030 Agenda and the achievement of its SDGs, in particular SDGs 7 and 13.

b) Objectives addressed

- Facilitate and promote the successful participation of Spanish research groups, businesses and other actors in European and international R & D & I programmes.
- Maximise synergy and partnership with entities outside Spain through public-private cooperation to promote foreign investment, as well as the participation of Spanish companies and research centres in international competitions and in the provision of components of large installations. Scientific opportunities and emerging technologies
- Seek alignment of state and regional aid with European programmes and synergy with European funds.
- Encourage the participation of seconded staff in the management and management bodies of international, European and intergovernmental R & D & I associations, in particular in the fields of energy and climate.

c) Policy mechanisms

- Calls for support to boost participation in European initiatives and projects and for the promotion of R & D & I management networks, especially under Horizon Europe119
- Maintain the structure of designated National Contact Points to facilitate and incentivise the participation of Spanish entities in European research and innovation funding programmes in the field of energy and climate (Horizon Europe, LIFE, Innovation Fund)
- Participation in international cooperation programmes and bilateral cooperation agreements, seeking a specific approach to energy and climate transition120
- Promotion of thematic networks and R & D & I projects, in cooperation with countries in Latin America and the Caribbean121, Asia and Africa, in the areas of renewable energy, micro-grids, storage, environment and water purification and detoxification
- Boost administrative processes to create units in other priority countries, with specialised staff to identify strategic lines of interest and facilitate attracting talent to our country
- Encourage the attraction of foreign investment in R & D & I, in particular from international foundations and funds
- Creation of support lines for the participation of Spanish research groups and other actors (including technology centres and other private entities) in European and international energy and climate fora, through multilateral, bilateral and interregional initiatives

119 Specific examples of these calls are: Europa Networks and Managers – Europe Technology Centres (CDTI), International Collaborative Projects (CDTI, EIP, ISCIII), Europe Research (REA), Europe Excellence (REA), European Project Management (EIP), SME Innovadors-Eurostars 3 Partenariate (CDTI) and DUT and CET Partenariados (formerly ERA-NETs).

These**120** include the Eureka Programme, PRIMA, ISGAN and EIA tasks, among others.

121 Through participation in programmes such as Cytec (Ibero-American Science and Technology for Development Programme), EU-CELAC, euro-CLIMA + or ONUDI.

d) Responsible

MICIU, through REA, CDTI and CIEMAT; MITECO; AECID

MEASURE 5.15. SPANISH CONTRIBUTION TO R & D & I FOR FUSION ENERGY

a) Description

ITER *(International Thermonuclear Experimental Reactor)* is one of the most ambitious international energy projects, which aims to demonstrate the scientific and technological feasibility of obtaining energy throughnuclear fu through magnetic confinement. ITER has been designed as the key experimental step between tomorrow's fusion researchfacilities and commercial fusion energy plants. To this end, ITER members (China, the European Union[122], India, Japan, Korea, Russia and the United States)are working to build the world's largest tokamak device in southern France. The primary objective of ITER is research and demonstration of ignition plasmas, where the energy produced by fusion reactions is sufficient to maintain plasma temperature, reducing or eliminating the need for external heating. It will also be the first fusion device to test the integrated technologies and physical regimes necessary for the commercial production of fusion electricity. The first plasma isplanned for 2025, although a delay of several years is expected as a result of a review of the current schedule.

Europe is responsible for most of ITER's construction costs (45.6 %), whose contribution will be up to and large in kind (approximately 85 %) in the form of provision of completed components, systems and buildings. Spain participates in this joint international experiment under ***Fusion for Energy*** **(F4E)**, the European Home Agency in charge of managing tenders for contributions for ITER. With its headquarters in Barcelona, one of the main tasks of F4E is to work together with European industry, SMEs and research centres to develop and provide a wide range of high-tech components, engineering, maintenance and support services for ITER. Their location in Spain facilitates the participation of Spanishdams and research centres in the various projects. Since 2008, our companies have obtained approximately 370 contracts, awarded from both the ITER Organisation and F4E, worth around EUR 1.350 billion. At the level of recruitment from F4E, Spain has been in thirdposition after France and Italy. F4E also supports fusion R & D initiatives through the ***Broader Approach Agreement (BA)***, a pact between Europe (through Euratom) and Japan, which aims to carry out activities complementary to the ITER project and accelerate the development of fusion, preparing for the construction of a **DEMO** Electricity Pro Reduction Demonstrator, which will aim to produce electricity from the fusion power generated within it. Spain is one of the countries that financially supports it, with CIEMAT, through the National Fusion Laboratory, the body that manages Spanish participation in BA projects, which are three: IFMIF/EVEDA, Tokamak JT60SA and IFERC (all located in Japan). Participation in the IFMIF-EVEDA project, the precursor of IFMIF-DONES, has been crucial to position Spain with an advantage towards the candiDatura to establish IFMIF-DONES in Granada.

The Fusion Programme contains a third pillar, known as **IFMIF-DONES *(International Fusion Materials Irra diation Facility-DemoOriented Neutron Source)***, which consists of the construction of a scientific facility to generate a neutron source to qualify the materials to be used in fusion power plants, and which will provide DEMO with the necessary data on the materials to be used in its design and construction. The Spanish public consortium IFMIF-DONES, set up in June 2021 by agreement[123] between the AGE (through MICIU) and the Junta de Andalucía, will be the body responsible for the design, construction and operation of the scientific IFMIF-DONES facility, which is based on a high-power particle accelerator and is located inGra. This project is part of the *ESFRI* European Infrastructure Roadmap.

b) Objectives addressed

- Promote fusion energy as a possible solution to environmental and energy supply problems.
- Enhance the participation of Spanish companies and research centres in the provision of components and services under the

122 In the framework of the EU, they participate in the ITER project: the 27 EU Member States plus the UK and Switzerland, both through Euratom. This represents a total of 35 participating countries.

123 Resolution of 18 June 2021 of the Secretariat-General for Research publishing the Agreement with the Autonomous Community of Andalusia for the establishment of the consortium to promote the construction in Spain of the scientific and technical infrastructure 'International Fusion Materials Irradiation Facility-Demo Oriented Neutron Source'.

Fusion Programme, increasing the technological capacities of companies in this field.

- Maximise the technological and industrial return resulting from the Spanish contribution to the Large Scientific Facilities and promote the highest possible relevance and technical excellence of the contracts implemented in these infrastructures by the national industry.

c) Policy mechanisms

- CIEMAT contributes to the development of fusion reactors and participates in the ITER and DEMO projects, through the National Fusion Laboratory, and in particular through the scientific exploitation of the Heliac Flexible ECJ II stellarator and associated auxiliary systems such as plasma heating and diagnosis and material study laboratories.
- CIEMAT also supports Spanish companies so that they can make the most of the opportunities that have arisen in large scientific facilities.
- The CDTI, such as ILO (Industrial Liaison Officer) acts as the contact point between Large Scientific Infrastructures (GICs) such as ITER and Spanish companies interested in participating in industrial opportunities, providing information on tenders, advising companies in submitting bids for technological supplies and monitoring the contracts awarded.
- Annual contributions from the AGE and the Regional Government of Andalusia to the IFMIF-DONES consortium, through transfers, grants or the allocation of European funds under the ERDF or ESF Operational Programmes.

d) Responsible

MICIU, via CIEMAT and CDTI.

MEASURE 5.16. MISSION INNOVATION 2.0

a) Description

Global challenges require a comprehensive response based on cooperation between governments. Decarbonising energy systems is an international priority and there is a proliferation of initiatives that jointly address certain aspects of the energy transition.

In this framework, the **Mission Innovation (MI)** initiative was launched at COP 21 in November 2015, as a global initiative made up of 22 countries plus the EU, to join global efforts in the fight against climatecam and the acceleration of clean, affordable and accessible energy technologies for all. A new Joint IF Declaration was launched in June 2021, setting up **MI 2.0**, to which Spain joined as a member country on 8 September 2022.

b) Objectives addressed

The objectives addressed in MI 2.0 are:

- Be an action-oriented forum for governments to be frontrunners in clean energy solutions through national innovation action and international cooperation
- Catalysing global action through public-private missions setting innovation objectives and targets
- Building trust in clean energy solutions through an innovation platform that facilitates knowledge sharing and collaboration
- Develop implementation pathways by actively working in partnership with the private and financial sectors to boost demand for new innovative solutions

c) Policy mechanisms

Spain participates in three missions[124]: Clean hydrogen, Green Energy and Urban Transition, through the EnergyTechnology taforms and the Cities Cities Platform.

d) Responsible

MICIU, through the Secretariat-General for Innovation and CIEMAT, with the support of ALINNE (see measure 5.13).

MEASURE 5.17. EUROPEAN FINANCING MECHANISMS FOR ENERGY AND CLIMATE INNOVATION

a) Description

In the framework of the European Union, beyond the Horizon Europe Framework Programme and the Structural Funds (such as ERDF and JTF) and Next Generation EU recovery, there are other financial instruments with potential to support R & D & I projects in the field of energy and climate, as they are fully or partially geared towardsthe energy transition and the development of technologies for the decarbonisation of the economy. These instruments include the following:

- **Financing facilities of the European Investment Bank (EIB)**: through the EIB's Roadmap 2021-2025 as the European Climate Bank, it[125] has increased its level of climate and environmental commitment, setting the target of doubling its climate change target from 25 % to 50 % by 2025. It also ceases to fund fossil fuel-related projects as of 2021. It should be noted that the EIB can support the whole spectrum of innovation technologies: from seed capital for development at a very early stage, to senior debt.

- **European Investment Fund (EIF)**: EIF Climate and Infrastructure Fund investments support high priority thematic strategies, including a main focus on climate action and environmental sustainability. It encompasses 6 strategies including the clean energy transition and sustainable transport.

- **InvestEU Fund**: set up for the long-term EU budget (2021-2027) as a successor to the Investment Plan for Europe, it brings together EFSI and thirteen other financial instruments to pool financing from the EU budget in the form of loans and guarantees under the same structure and intended to support four policy areas: (1) sustainable infrastructure; (2) research, innovation and digitalisation; (3) small and medium-sized enterprises; (4) social investment and skills. It should be noted that at least 30 % of InvestEU investments will promote projects that will contribute to the achievement of the European Union's climate action objectives, positioning it as one of the main Community initiatives to implement the European Green Deal Investment Plan.

- **European Innovation Fund (IF***)*: one of the main funding programmes for the 2020-2030 period focusing on innovative low-carbon technologies, where revenues come from the EU Emissions Trading System (EU ETS) and the outstanding NER300 programme. It operates through calls for large and small-scale projects focusing on: innovative low-carbon technologies and processes in energy-intensive industries (steel, cement, glass, chemicals, paper, etc.), including products replacing carbon-intensive industries; Carbon Capture and Utilisation (CCU); Construction and operation of carbon capture and storage (CCS); Innovative renewable energy generation; Energy storage

- **Connecting Europe Facility – Transport, Telecommunications and Energy** (**CEF,** *Connecting Europe Facility*): programme supporting investment in European digital, transport and energy infrastructure networks in order to achieve the twin green and digital transitions by contributing to the ambitious objectives of the European Green Deal and the Digital Decade in the financial period 2021-2027. Supports the objectives of the Sustainable and Smart Mobility Strategy and contributes to further integration of an efficient and competitive energy market, increased interoperability of networks across borders, as well as facilitating decarbonisation and cross-border cooperation in the fields of energy and transport.

b) Objectives addressed

Mobilisation of European funds to finance the R & I & c dimension of the NECP.

124 For more information on the Spanish participation, see p. 90-105 of the report: Mission Innovation Members insight 2022-2023
125EIB Group Climate Bank Roadmap 2021-2025

c) Policy mechanisms

The use of the various European energy and climate mechanisms will be encouraged.

In this regard, the agreements of the Instituto de Crédito Oficial (ICO) with the European Investment Bank (EIB) and/or the European Investment Fund (EIF) have made it possible to channel large amounts of money from these institutionsto the Spanish economy. At the same time, ICO has promoted the participation of investors from the incumbent prisector and financial institutions in projects under the CEF programme. Since 2021 ICO has been accredited by the European Commission to manage InvestEU funds as an Implementing Partner for the period 2021-2027. This accreditation also allows ICO to participate in other programmes of the European Union's Multiannual Financial Framework 2021-2027**.**

The CDTI is working to become part of the Implementing Partners for InvestEU funds.

d) Responsible

ICO; MICIU via CDTI; MITECO and other ministries financing R & D & I using European funds.

MEASURE 5.18. REGULATORY TEST BANK IN THE ELECTRICITY SECTOR

a) Description

The transition to a 100 % renewable electricity system in 2050 poses significant challenges, since in order to managethe variability of generation it is necessary to increase the flexibility of the system with new actors and services, and with different configurations and interactions between technologies and actors, and these transformations imply a continuous adaptation of the regulation of the electricity sector. Therefore, the speed with which camps are producedin this sector requires an environment conducive to research and innovation in the sector. However, innovative projects often encounter regulatory barriers that prevent the development of tests and models to support the analysis of the desirability of amending regulation on a neral basis,or the functioning and usefulness of a given system, service or technology. In this context, regulatory testbeds emerge as experimental, controlled and government-supervised environments, where potential regulatory improvements in narrowed environments can be tested, in order to review and act on theregulatory framework to move those developments verified into the experimental environment. All thiscontinues to prevent quality and security of supply, the absence of risks to the electricity system and its economic and financial sustainability, as well as consumer protection. In short, this instrument makes it possible to boost innovative activity and foster regulatory learning and dialogue, leading to aregulatory sea capable of better adapting to new needs and adapting to the entry of new players into the electricity market, thereby encouraging the creation of innovative companies and giving them the opportunity to test their business models.

Pilot projects participating in the electricity test bed shall include experimental testing and shall require at least an exemption from the regulation of the electricity sector, with the ultimate goal of achieving regulatory innovation. In any case, these pilot projects should be limited in size, duration and geographical scope. The regulatory exemption consists of a temporary permit to exempt partial compliance with a standard, including the possibility of acting in the absence of regulation, within the electricity sector. In any event, European law is applicable and no exemptions contrary to the internal market may be authorised.

b) Objectives addressed

- Facilitate research and innovation in the field of the electricity sector.
- Encourage regulatory learning and better regulation.
- Contribute to achieving the objectives of energy, climate and environmental sustainability.

c) Policy mechanisms

Law 24/2013 of 26 December 2003 on the electricity sector provides that the general framework of the regulatory test bed for the participation of pilot projects is to beregulated by Royal Decree of the Government and that, subsequently, specific calls will be issued by order of the Minister forEcological Acquisition and the Demographic Challenge.

In accordance with the provisions of that law, Royal Decree 568/2022 of 11 July 2007 establishing the general framework for the regulatory test bed for the promotion of research and innovation in the eléctrico sector was approved, and Order TED/567/2023, of 31 May, announcing access to the regulatory test bank for the promotion of research and innovation in the electricity sector, provided for in Royal Decree 568/2022 of 11 July 2007.

d) Responsible

MITECO.

3.6 Cross-cutting aspects in the green transition

So far, throughout this section, policies and measures have been structured around the five axesdefined in Regulation 2018/1999 on Governance of the Energy Union and Climate Action. However, this section addresses three issues that are cross-cutting to the five dimensions described.

Firstly, some measures that are cross-cutting throughout the Plan, without being able to fall into a particular category, but have an effect on all of them. Examples include the gender perspective, adaptation to climate change or elements related to environmental conservation, derived from the strategic environmental assessment process,which culminated in the previous NECP, which will be addressed in this review.

Secondly, this section includes synergies and interlinkages between this NECP and other plans. An example is the recovery and resilience plan, which has been used as a solid basis126 for the configuration and design of the green component of the recovery plan by the NECP 2021-2030. The same analysis is transferred to other plans, such as the Just Transition Fund, the Social Climate Fund, the Common Agricultural Policy and the Cohesion Policy.

Finally, the interlinkages between the policies and measures of this NECP are shown. It should be noted at this point that one of the guiding principles of this Plan is '***energy efficiency first***', since an increase in energy efficiency leads to a reduction in energy needs, which in turn contributes to the decarbonisation ofthe system, causing me to reduce emissions, while increasing energy independence. In turn, a smaller size of energy needs in production sectors increases competitiveness by reducing energy costs, thus contributing to the internal market dimension.

3.6.1. Gender mainstreaming

MEASURE 6.1 GENDER PERSPECTIVE

a) Description

As**126** stated by the European Commission in its assessment of the NECP of October 2020, recommending that it be used to address the configuration of the Spanish PRTR.

Gender equality is a key cross-cutting factor in the green transition. Therefore, one of the commitments of Spain'sOpen Government to the Generation Equality Forum coordinated by UN Women is '*Gender equality and the empowerment of women and girls in the green transition in Spain'*, in line with the gender perspective that has been integrated at national level into the strategic and regulatory framework of the green transition. This is the case, among others, for the Law on Climate Change and Energy Transition; the Government Declaration on the Climate and Environmental Emergency; the PNACC 2021-2030; the Long-Term Decarbonisation Strategy 2050 (LTS); of the Just Transition Strategy (JTS); the Energy Storage Strategy (SEA); of the Self-Consumption Roadmap (HRA); the first Circular Economy Action Plan (CEAP); and the PRTR. In addition, environmental mainstreaming is part ofthe strategic sea of equality policies. Therefore, measures in the Strategic Plan for Effective Equality of Women and Men 2022-2025 (ESPEMH) integrate ecological and social sustainability from an intersectional gender approach.

Therefore, this measure of the NECP aims to strengthen the cross-cutting integration of the gender dimension withintersectional perspec into all measures in the NECP that have a direct or indirect impact on people, tally onemployment in the energy sector, but also on leadership positions, entrepreneurship and innovation in this sector, as well as in analysing and promoting sustainable production and consumption patterns,and in general assessing the role of women in all their diversity (urban and rural areas, all ages, etc.) as active subjects of change in the energy transition. As a starting point, the International Energy Agency (IEA) has found in various reports in 2022127 (and in its new gender and energy data portal128) that significant gender gaps persist in this sector, where the under-representation of womenis greater than in all other economic sectors, not only in terms of employment, but also in business leadership positions, entrepreneurship and innovation. Closing these gaps is key to achieving more innovative and inclusive solutions in the energy transition. In fact, in employment in renewable energy, thegender gap is lower: according to the IRENA report (2022) on a gender perspective in solar volttering,129 women account for 40 % of full-time employment in this sector, above 32 % in all renewables, and almost twice as much as in the wind sector (21 %) and in oil and gas (22 %), but in management positions the gap is greater than in employment. The report on *Women's employment in the just energy transition in Spain*,130 published in 2023 by the Naturgy Foundation in collaboration with the Institute for the Just Transition, presents quantitative and qualitative analyses of which it can be highlighted that, although 4 out of 10 women have entered the new net jobs created in Spain in the sector in recent years, only one fifth of all jobs in the sector are occupied by women. Also, on the basis of the qualitative results of this study, key recommendations are highlighted to make more rapid progress towards gender equality in employment in the energy transition131. On the other hand, the MITECO report and database on ' *Green entrepreneurship by women and women's entrepreneurship in rural*areas'132 shows that mobile entrepreneurshipand men's renewable energy entrepreneurship in Spain is barely representative, but in paid employment in this sector women account for 36 % of the total, below 48 % of women in overall paid employment in all economic sectors. It also notes that the role of the social economy in green or rural entrepreneurship, cooperatives,is extremely small for women and men.

There is a growing call for strengthening the close link between gender equality and green employment133. TheCommission's action-oriented commitments highlight the current UNFCCC Gender Equality Plan and the Equal by 30 campaign, to which the

127 World Energy Employment (available at httpsEU-level //www.iea.org/reports/world-energy-employment). Understanding Gender Gaps in Wages, Employmentand Career Trajectories in the Energy Sector, based on data from Spain (2006-2018), Portugal (2002 2017), France (2002-2018), Germany (2002-2018), and Austria (2000-2018), available at httpsendeavour //www.iea.org/articles/understanding-gender-gaps-in-wages-employment-and-career-trajec- tories-in-the-energy-sector.

128 Gender and Energy Data Explorer. Differentiated data on gender gaps in the energy sector in employment and wages, senior management, entrepreneurship and innovation

129 Solar PV – A Gender Perspective of the Gender Perspective Series

130 Report Women's employment in the just energy transition in Spain (2023)

131 Some of these recommendations are highlighted in Actions and strategies to make the energy transition more employment opportunities for women.

132 Women's green entrepreneurship and rural entrepreneurship

133 For example: Opinion of the European Committee of the Regions – Gender equality and climate change: towards gender mainstreaming in the European Green Deal (adopted on 27 January 2022); ILO (2022) Just Transition Policy Brief – Gender equality, labour and a just transition for all (available at httpsendeavour//www.ilo.org/wcmsp5/groups/public/ --- edoutliningemp/---empappendix/documents/publication/wcmsexchanging 860569.pdf); ILO and EC (2023) Greenpleos, an opportunity for women in Latin America (accessible from httpsEU-level //www.ilo.org/americas/sala-de-prensa/WCMS_870976/lang--es/ index.htm); OECD (2022) Empowering Women in the Transition Towards Green Growth in Greece (in httpsendeavour//www.oecd-ilibrary.org/environment/ empowering-women-in-the-transition-towards-green-growth-in-greeceendeavour a9eacee6-en); Empowering Women to Power the Green Transition (at https:// oecdcogito.blog/2023/03/08/empowering-women-to-power-the-green-transition/)

Spanish Government has subscribed, which is a joint initiative of the Clean Energy Ministerial Forum (CEM) and the IEA aimed at achieving the objective of equal pay, equal leadership and equal opportunitiesfor women in the clean energy sector by 2030134. With this accession, the Spanish Government supports the 4 high-level principles for public sector governments in Equal by 30 (e.g. leading by example or regularly reporting progress), and highlights four specific commitments of its own to develop concrete lines of action to accelerate the changes needed to achieve effective equality between women and men in the energy transition. These commitments are aimed both at closing gaps in training and in the different areas of employment, entrepreneurship, innovation and leadership, and at improving thequality of data generation and use, and promoting collaboration with entities and fora at different levels. It is clear that in order to achieve a balanced participation of women and men in the sector by 2030, when we are facing-significant gender gaps today, it is necessary to accelerate the necessary change by encouraging and strengthening proactive measures in this regard that complement and develop those initiated, planned or proposed in recent years that have shown significant impacts on the right direction or are recommended with high potential to generate them.

In addition, the Institute of Women (Ministry of Equality), as the body involved in the 2021-2025 Work Plan of the NAPCP, has published a nationwide study on 'Climate Risks from a Gender Perspective: Perception, positioning and adaptation in women and men' (2021)135 and another on 'Analysis on sustainable and resilient lifestyles in the face of the climate emergency: a gender-responsive approach (2022)136, highlighting some gender gaps and barriers, from which the former suggests gender indicators on climate disaster risks, as well as other recommendations for gender mainstreaming in climate action and disaster risk management policies. The second emphasises that public and private action on mitigation and adaptation must address the needs and problems of women and men, while taking into account factors of social vulnerability (in terms of educational level, migrant status, disability, etc.), withshort and concrete rewards for this purpose in terms of references, networks, training, research, information and means of como nichetargeting areas such as energy sovereignty and the deployment of renewable energies, water management, care, leisure, and collective or community initiatives.

b) Objectives addressed

- Achieve a balanced representation of women and men at all levels and areas of the transition to a climate-neutral economy, with full, equal and meaningful participation of women, including access to the benefits resulting from energy and climate investments and reforms.
- Gender mainstreaming in the energy transition, so that the policies and measures of this Plan are designed to reduce the gender gap in energy uses and in women's participation in the energy sector, and it is important to train all sectors related to energy and climate change in a gender perspective.

c) Policy mechanisms

The positive gender impact of energy and climate investments and reforms shall be enhanced through the following policy mechanisms:

- **Improving knowledge of the sector from a gender perspective**

  Studies will be needed to deepen knowledge of the state of the energy sector, in terms of employment, impact, perceptions, in order to design measures and public policies to promote the reduction of the gender gap.

- **Progress in the implementation of the gender equality axes and measures in energy and climate already included in the current national policy framework (such as ETJ, PNACC, ELP, EAE, HRA, PRTR and PEIEMH)**

  Key to this is gender analysis of the patterns of investment, research and innovation, employment, entrepreneurship, production, consumption, storage, mobility, social acceptance, citizen participation, etc., which relate to energy and climate, in particular renewable energy, to align public policies and make them more effective and efficient, enhancing synergies that both accelerate

134 Framework Convention on Climate Change and accession of Spain to the Equalby30 Campaign
135CLIMATE RISKS FROM A GENDER PERSPECTIVE. Perception, positioning and adaptation among women and men
136 ANALYSIS ON SUSTAINABLE AND RESILIENT LIFESTYLES IN THE FACE OF THE CLIMATE EMERGENCY. A gender-responsive approach

positive impacts towardsclimate neutrality and gender equality. This has a particular interest in ensuring access to clean energy needed to care for people in different types of households, including those affected by energy poverty and those in rural settings.

- **Promoting women's participation and leadership in new green jobs resulting from the energy transition**

  Women's participation in employment in the energy transition will be analysed and measures will be proposed and implemented to reduce participation gaps, pay gaps and vocational training initiatives.

- **Gender mainstreaming in the design of reforms and investments**

  To this end, the workstream of the aid lines linked to the PRTR will continue, including in the proudbases the measures implemented to close the gender gap as a positive externality.

- **Promoting gender equality in employment, leadership, entrepreneurship and innovation**

  To close gender gaps in employment (including pay), leadership positions, entrepreneurship and innovation, especially in the energy sector, beyond the current national framework mentioned above, the adherence of the Spanish Government to the commitments for the public sector included in the Equal by 30 initiative will be key.

- **Promoting gender equality in mobility and transport policies**

  The public sector must promote and implement a gender perspective intransport and mobility policies and actions in all areas (urban, rural, interurban) and modes, in order to meet citizens' daily mobility needs, properly plan and design infrastructure and be transportdefects, ensure equal opportunities for men and women in employability, and keep workingconditions for staff to attract talent to this profession in the sector.

d) Responsible

General State Administration, Autonomous Communities and local authorities

3.6.2. National Plan for Adaptation to Climate Change

MEASURE 6.2 MAINSTREAMING OF CLIMATE CHANGE ADAPTATION OBJECTIVES

a) Description

Spain has a high potential for renewable resources, which puts it in an advanced position to transition to an emission-free energy system. However, it is necessary to considerthe potential effects of climate change throughout this transition process, as it is in a region that isparticularly vulnerable. Projections point to an increase in average temperature and an overall reduction in water resources. All studies also anticipate a sharp increase in the risk of droughts, which will be more frequent, long and intense, and floods, with more frequent flooding and higher maximum flows. It is also expected that adverse climatic events, such as heat waves, or coastal phenomethat could affect coastal energy installations will become more frequent.

The objectives and lines of action on adaptation to climate change in Spain are set out in the[137]NAPCP, including areas of work such as energy, mobility and transport, water resources, coasts and the marine environment, industry, forests or the agricultural sector and food.

The NECP contributes to the objectives of the NECP and its five dimensions through the concrete measures integratedinto its Work Programmes (WP) and the NECP contributes to the NECP through some of its measures, witha stable synergistic flow in both

137 National Plan for Adaptation to Climate Change

directions that reinforces both plans and ensures a “proof” transition of climate change.

Specifically in the field of energy, the **objectives set out in the NAPCP** are:

- Improving knowledge of the impacts of climate change on renewable energy production potentials and translating the results into energy planning (see table, Potential RENOV).
- Improve knowledge on the impacts of climate change on energy demand and identify measures to avoid or limit peak demand, especially those associated with heat (see table, ENER demand).

-Improve knowledge on the potential impacts of climate change on the functionality and resilience of energy generation, transmission, storage and distribution systems and specify adaptation measures to avoid or reduce the identified risks (see table, SIST Resilience).

-Identify risks arising from extreme events in critical energy infrastructure and implement measures to prevent their loss of functionality.

The NECP contributes to the first three objectives by implementing the measures set out in the tablebelow, in which the most significant relationships have been shaded.

			Potential RENOV	Demand ENER	Resilience SIST
DECARBONISATION DIMENSION	Measure 1.1.	Development of renewable energy compatible with biodiversity and ecosystem protection			
	Measure 1.2.	Development of renewable energy compatible with the territory and rural development			
	Measure 1.3.	Development of new electricity-generating installations using renewable energy			
	Measure 1.4.	Development of innovative renewable energy installations			
	Measure 1.5.	Energy storage			
	Measure 1.6.	Demand management and flexibility			
	Measure 1.7.	Adaptation of electricity grids for the integration of renewables			
	Measure 1.8.	Development of self-consumption with renewables and distributed generation			
	Measure 1.9.	Development of new hydroelectric storage capacity			
	Measure 1.10.	Decarbonisation of the industrial sector			
	Measure 1.22.	Unique projects and strategy for sustainable energy on islands			
	Measure 1.31.	Life cycle assessment of buildings			
ENERGY EFFICIENCY DIMENSION.	Measure 2.1.	Low-emission zones and sustainable urban mobility			
	Measure 2.2.	Modal shift in freight transport with a higher presence of rail			
	Measure 2.3.	Renovation of rolling stock of means of transport with more efficient ones and improvements in management			
	Measure 2.4.	Improving the efficiency and sustainability of ports			
	Measure 2.5.	Promotion of electric vehicles			
	Measure 2.6.	Improvements in technology and process management systems for non-energy intensive industries			
	Measure 2.7.	Improvements in technology and process management systems for energy-intensive industries			
	Measure 2.8.	Energy efficiency in existing buildings in the residential sector			
	Measure 2.9.	Renewal of residential equipment			

An example of the NECP's contribution to the NECP can be found in measures such as 'Lower Emisio Zones' or 'Energy efficiency in existing buildings in the residential sector', the implementation of which offers a great deal of tunit topromote urban adaptability to the impacts of climate change, through interviewsin the physical space released from circulatory use that help combat the heat island effect. improve soil permeability and promote 're-naturalisation', natural connectivity and improvement of the biodiversity of ur bana, in line with the PNACC and its first Work Programme 2021-2025, as well as the Environmental Promotion Plans, with incentives in the above-

mentioned actions. .

On the other hand, the proposed measures to improve agricultural and forestry sinks include actionsaimed at increasing the levels of soil organic carbon, which results in improving soil structure by making soils more efficient in moisture abstraction and retention and in protecting against erosion,thus placing emphasis on improving the resilience of agricultural and forestry soils.

Conversely, the NAPCP promotes the analysis of energy resources that may be affected by climate change, the assessment of climate change risks in various sectors and the development of climate-resilient infrastructure. These aspects contribute to the safety of installations and operations.

b) Policy mechanisms

Among the **financial resources** available for the development of the NAPCP are:

- PIMA funds from revenues from the auctioning of allowances will finance a diverse range of measures in the Work Programme (WP), through two main modalities: PIMA funds, managed by various units of the general state administration and territorialised PIMA funds (managed through the Autonomous Communities after agreement of the Sectoral Conference on the Environment).
- Funds from the PRTR. Given the weight given to the fight against climate change in the Plan and the confluence between its objectives and the 2021-2030 PNACC, the funds in the PRTR will undoubtedly play a role in the financing of the measures provided for in the PT of the PNACC through several of its components, such as component 1 'Sustainable, safe and connected mobility shock plan in urban and metropolitan environments', component 2 'Housing rehabilitation and urban regeneration plan', component 4 'Conservation and restoration of ecosystems and their biodiversity', component 5 'Preserving coastal space and water resources' and 6 'Sustainable, safe and connected mobility', among others.
- In addition, the various departments responsible for implementing the measures included in the Work Programme will sometimes use their own resources for their implementation.

The NACC is developed through Work Programmes (WP) and incorporates specific lines of action for the 18 areas of work of the NAPCP. Many of these areas (waters, coasts, energy, etc.) are essential to ensure that activities and infrastructure related to the energy transition are viable in the current and future climate (*future proofing*).

These lines of action, at operational level, are translated into concrete measures included in the Quine-Quenal Work Programmes,which are regularly reviewed to propose new measures in cases where new needs are identified or to address measures that have not been technically or economically feasible at any given time. The measures set out below are complementary to those undertaken by other (public andtwo) actors in the energy sector (generation, transport, storage, distribution and marketing) as many of them carry out sectoral risk analyses and take measures to reduce their risks to climatechange. This document contains only initiatives initiated by the General State Administration. The measures proposed are an extract from both the NAPCP, which is the main strategic document at national level to address adaptation to climate change, and its Work Programme.

Furthermore, it should also be stressed that successive progress reports will take into account the findings for the energy field both in the European climate risk assessment published in March 2024 and in the upcoming national climate change risk and impact assessment to be finalised in 2025.

The main measures of the NAPCP Work Programme, grouped by work area, which contribute to one of the five energy dimensions included in the NECP, are listed below. Most of the measures described are of continuous development and have already been implemented under the NAPCP. They are embedded in a monitoring and evaluation process that allows for continuous improvement of the system.

Water and water resources

Water and water resources are central to the energy transition due to their role, in hydropower production, plant cooling and other applications related to energy production. These uses may be compromised by the reduction of water resources associated with climate

change.

In this regard, it should be stressed that the transition envisaged in the NECP to a diversified energy system, with greater penetration of renewable energies less dependent on the use of fresh water such as wind andtaica photovol, is in itself a way of strengthening the system's resilience to scenarios of greater water scarcity.

Furthermore, the NACC incorporates a number of measures, described below, which take into account the role of water and associated ecosystems in the energy transition and which contribute to some of the dimensions of the NECP:

- Studies on water-energy links and incorporation of their results into energy planning

  This measure follows on from previous work and has two objectives: study the effects of climate change on water demands for energy use and take its results into account in hydrological planning.

  Due to climate change, changes in precipitation patterns, reduced flow rates, increased drought frequency and intensity, and increased water temperature will have an increasing impact on power generation, both hydropower and from generation systems that requirethe use of water for cooling. It is therefore necessary to analyse these risks and integrate them into energy planning. Furthermore, water planning and management will require new energy requirements linkedto the increase in the use of alternative water sources, such as desalination or reuse, and it is therefore necessary to consider them in energy planning, promoting their coverage through renewable energy sources.

  This measure, related to decarbonisation and energy security, improves the knowledge and management capacity of the water resource for renewable hydropower generation or for other water-demanding energy installations.

- Incorporating adaptation to climate change into water planning

  River basin bodies shall develop climate change risk analyses within theirriver basin districts, which shall result in measures to reduce those risks. This planning will facilitate arational use of water and improve the resilience of water infrastructure in a climate changescenario. This measure will therefore contribute to the energy security dimension by improving the sustainability of water use in energy production.

- Development of actions aimed at improving the status of surface water bodies and associated aquatic ecosystems

  Under this measure, actions are carried out to improve the status of bodies of surface water and eco associated aquaticsystems, including river restoration and green infrastructure projects, improvement of the hydromorphological conditions of water bodies and nature-based solutions. Theseactions cover the improvement of river connectivity (longitudinal and transversal) and the restoration of the riverforest, among others.

  This measure can contribute to the decarbonisation dimension, through the reduction of greenhouse gases through the restoration of rivers and wetlands, and their riverside vegetation, strengthening their role asCarbon Tanks.

Forestry sector

A combination of factors, including their geographical location, straddling European continents and Africanot, their complex terrain, as well as historical and cultural factors, explain the great diversity of forest ecosystems in Spain.

The effects of climate change on these ecosystems are already evident in many respects: changes in the distribution of wooded and non-wooded forest formations, structural and functional changes, alterationsto certain parameters of forest health, increased vulnerability to weather events ex tremosand fires, or changes in the flow of environmental goods and services provided by forests, among others. The projected impacts, according to future climate scenarios, point to a progressive intensification of these effects as the 21st century progresses. Forestry activities are also subject to various kindsof miscellaneous uncertainties and uncertainties arising from climate change: abiotic (environmental and biophysical), biotic (pests and diseases) and economic.

All these changes on forest ecosystems have an effect on the capacity tocapture and capture CO_2 and therefore on mitigation targets

in sinks, contributing to the decarbonisation dimension**.** Incorporating the adaptation perspective is indispensable in order to ensure the long-term maintenance of forest ecosystems and thus underpin mitigation policies relating tosinks.

In order to address this issue, the PT of the NAPCP sets out:

- The review of the main planning instruments for forests and the Spanish forestry sector incorporating recent knowledge of projections, impacts and adaptation to climate change

  The NACC proposes a revision of the main planning instruments for forests and the Spanish forestry sector so that they integrate the adaptation perspective and ensure coherence of forest-related policies, creating conditions for the multifunctional potential of Spanish forests to be managed for sustainable and balancedpurposes, allowing forests to provide a set of vital services that are indispensable.

- Actions for the coordinated fight against land degradation and increased risk of desertification through complementary and synergistic strategies and measures with adaptation to climate change

  The interactions between desertification and climate change are evident and well documented. Many responses contributing to climate change adaptation can also combat desertification and land degradation, and it is therefore essential to deepen coordinated work on both aspects to achieve complementary and synergistic strategies and measures. Addressing desertification and land degradation, including improving the organic matter content of agricultural and forest soils, in a manner consistent with climate policies, can additionally generate many co-benefits, including climate change mitigation.

- Actions for the mobilisation of actors and sectoral integration in forest fire prevention and fight

  Heatwaves or periods with extreme temperatures and low relative humidity are directly associated with the occurrence of large forest fires, as they result in greater fuel willingness to burn and, consequently, easier ignition and propagation. The ecological knowledge of forest systems makes it possible to address the expected impacts of climate change and manage landscapes tokeep them more resilient and resilient to increased fire incidence. The integration of sectoral policies and the involvement of actors with responsibility in the forestry area – as well as the promotion of pastoral agro-forestry systems and traditional uses such as pastoralism – are a good mechanism for putting in place adaptive measures to address the increase in the danger of fires.

Coastal area and coastal infrastructure

Part of the strategic energy infrastructure is located in coastal areas. The PNACC PT contributes to the internal energy market dimension and energy security dimension through a series of measures focusing on coastal areas that improve the resilience of these areas, supporting a large number of energy installations. In addition, they contribute indirectly to decarbonisation by facilitating the safe deployment of renewable energy installations such as the selection of the most suitable areas for installing theancillary elements required for the production of, inter alia, offshore wind or ocean energy. Some of the measures promoted and implemented under the NAPCP include:

- Development of adaptation initiatives in the Public Land Maritime Domain (DPMT) and related spaces

  Among the objectives of these initiatives is to increase the resilience of coastal infrastructure to the impacts of climate change. The development of measures to combat erosion and to strengthen the coastline makes it possible to improve the adaptive capacity and resilience of the coastal area itself as a support for essential activities in the energy transition.

- The development of methodologies and tools to manage climate change risks in the coastal area

  This measure makes it possible to make available to both the public and private sectors with strategic interestsin coastal areas online tools, online viewers or methodologies for analysing coastal risks against climate change, which make it possible to improve knowledge of the most suitable locations to ensure the viability of the facilities throughout their lifetime.

In addition, the PT promotes the drafting of climate change adaptation plans for key coastal elements such as:

- Adaptation plans for state-owned ports.
- Plans for adaptation in DPMT sites belonging to the Autonomous Communities or ports transferred to them.

Adaptation plans in State-owned ports contribute to energy security as they allow for import and commercial activities related to different energy sources with an adaptive planning view and can provide shelter for energy installations.

Transport infrastructure – roads, railways, airports and ports —

Transport infrastructure plays a crucial role in the energy transition. The safety of the facilities, of the operability and of the functioning of the logistics chain depends to a large extent on ensuring the long-term functionality of these infrastructures. This involves designing and implementing them on the basis of the climate scenarios that can be considered throughout their lifetime and implementing adaptation measures.

The NAPCP envisages a number of actions to advance these objectives, such as:

- Reviewing climate variables that affect the design and functionality of infrastructure – roads, railways, airports and airports – and the thresholds that interfere with their operability.
- The identification, analysis and evaluation – on the basis of climate change projections – of regulations, instructions and standards for calculating and designing infrastructure – roads, railways, airports and ports – and buildings and auxiliary envelopes for transport.
- Reviewing, evaluating and strengthening emergency protocols, contingency plans and alert systems for transport infrastructure, taking into account the risks arising from climate change.
- The vulnerability assessment of existing transport networks and systems and the development of action plans for improving resilience.
- Integrating climate change into instruments for overall transport and mobility planning.

These measures contribute to decarbonisation and energy security by favouring resilient infrastructure systems that enable a modal shift from safe transport, for example through improvements in rail infrastructure planning and design, and energy efficiency by incorporating climate change adaptation criteria into regulations, instructions and standards for infrastructure calculation and design.

Energy

The NAPCP includes a series of energy-specific measures that allow action to be taken on Friesaffecting the various components of the energy system with an impact on the decarbonisation dimensions, and on energy efficiency and security:

- The studies, already discussed, on water-energy links and their incorporation of their results into energy planning, as well as the analysis of the potential for hydropower production in various climate change scenarios**,** will facilitate, inter alia, the planning of the electricity system, taking into account the evolution of water resources in a climate change scenario.
- The analysis of the evolution of electricity demand (and especially peak demand) in a climate change framework includes taking into account projections of changes in electricity demand, as a result of climate change, in order to gauge the capacity and flexibility of the electricity system to cope with peak demand.

Research & innovation

The main objective of this area of work of the NACC is the integration of adaptation into future GIAS strategiesand science, technology and innovation plans, fostering the creation of spaces for exchange, collaboration and coordination between research staff and the different adaptation actors, enabling the development of methodologies and tools for the estimation of climate change risks and informed decision-making for adaptation. The main contribution of this area is therefore to the research, innovationand competitiveness dimension of the NECP.

One of the documents developed in this framework was the *'Guide to the assessment of risks associated with climate change'* published in 2023, which will strengthen the identification of impacts and risks of any sector, as a phase prior to the implementation of measures to adapt to climate change.

Among the most notable measures in this area are:

- The promotion of research actions on adaptation to climate change under the Strategic Climate, Energy and Mobility Line of the Spanish Strategy for Science, Technology and Innovation (2021-2027).
- Encouraging and supporting Spanish participation in the Work Programmes 2021-2022 and 2023-2024 of Cluster 5: Climate, Energy and Mobility under the Horizon Europe Programme

Climate and climate scenarios

Maintaining and improving systematic observation of the atmosphere, land and ocean, as well as monitoring of the state of the climate and key variables of the climate system is key to ensuring energy production and supply.

It is also intended to increase the availability and accessibility of data, both for the general public and for specialised sectors. In addition, these actions make it possible to prevent the potential impacts associated with adverse weather and climatic events, as well as the establishment ofwarning services and warning worlds, contributing clearly to the safety and energy efficiency dimensions.

The aim is also to make the best possible knowledge of future climate change scenarios and projections available to all interested parties in order to achieve the transition to renewable energy sources, thereby also contributing to the decarbonisation of the economy.

The NAPCP provides in this regard:

- The implementation of climate services in various domains, providing, as appropriate, historical data, short- and medium-term forecasts and climate change projections and improving access to and dissemination of national and international climate services.
- Reviewing alert systems to adapt them to new risks associated with climate change

City, urban planning and building

The NACC also promotes coordinated climate change adaptation and mitigation measures in urban and peri-urban areas through the Climate Change PIMA. This programme – launched in 2020 – encourages and supports climate change adaptation in urban and peri-urban space, enhancing synergies between adaptation and mitigation strategies in the fight against climate change at local level. For example, the adaptation of public buildings to prevent excess heat or the application of nature-based solutions aimed at preventing risks from climate change are adaptation objectives that contribute to mitigation by reducing the use of energy needed for air conditioning.

Also from the PNACC and from different areas of the AGE, *urban re-naturalisation* measures are being promoted to promote interventions to restore urban river ecosystems and restore and create naturalised spaces in cities. This is a set of actions to move towards sustainable and healthy urban design and adapt built areas to the impacts of climate change, increasing nature and green areas in the city. These measures also improve urban mobility by creating more friendly spaces for pedestrians and cyclists.

(D) Responsible

Water:

- MITECO
- Hydrographic confederations
- Biodiversity Foundation

Forestry sector:

- Autonomous Communities
- MITECO
- Biodiversity Foundation
- Ministry of Internal Affairs

Energy infrastructure in coastal areas:

- Autonomous Communities
- MITECO
  - Public Agency of State Ports and its Port Authorities

Transport infrastructure:

- MITRAMS, with the public administrations owning infrastructure and public entities.

Energy

- MITECO
- Biodiversity Foundation

Research and innovation:

- MICIU, MITECO

Climate and climate services:

- MITECO

Urban planning:

- MIVAU
- MITECO
- Local authorities

3.6.3. National Air Pollution Control Programme

MEASURE 6.3. INTEGRATION OF THE OBJECTIVES OF THE NATIONAL CONTROL PROGRAMME AIR POLLUTION

a) Description

The National Air Pollution Control Programme (NAPCP) is an obligation laid down in Directive(EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants and transposed into Spanish law by Royal Decree 818/2018 of 6 July on measures to reduce national emissions of certain atmospheric pollutants.

Both standards, among others, set emission ceilings for sulphur dioxide ($S0_2$), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC), ammonia ($NH3_)$, and fine particulate matter (PM2,5).

In accordance with the Strategic Environmental Declaration of the PNIEC 2021-2030[138], section *2 of the mostsignificant environmental elements: Potential negative impacts and measures,* the Plan will have significant positive effects on the population, particularly on human health due to reduced emissions of at mospshericpollutants. It is also mentioned that one of the objectives of the plan is to reduce the use of fossil fuels, which entails the reduction of polluting gases into the atmosphere.

However, in Table 2. The potential negative effects identified on the factors of the medium by the implementation and development of the measures provided for in the NECP and environmental measures for the minimisation of impacts is a first section presenting the negative impacts identified in the SEA on air quality and the corresponding environmental measures and recommendations.

This measure therefore falls within the scope of the measures referred to in the last paragraph of point *3.6.1 above. Integration of environmental aspects into the NECP* and proposes to contribute from the NECP to the objectives of the NAPCP in order to mitigate the potential negative effects on air pollution mentioned in the ESAE of the NECP.

b) Objectives addressed

In accordance with the Strategic Environmental Declaration of the NECP 2020-2030, the aim is to:

- Minimise the generation of pollutant emissions to air during works
- Reduce emissions associated with the use of biomass in accordance with Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources. It lays down an obligation since 2021 for solid biomass used for electricity generation to comply with **sustainability and GHG reduction** criteria in order to be eligible for support and to count towards the renewable targets of the NECP. For the purpose of verifying compliance with the above criteria, the Directive allows the use of voluntary private schemes or national schemes developed by the competent authorities.
- Reduce agricultural burning
- Encourage composting of agricultural waste

c) Policy mechanisms

- Actions contributing to air pollution control under the NECP will be promoted:
- Promoting the efficient use and refurbishment of biomass combustion equipment
- Assessment and implementation of standardisation of characteristics of biomass from sustainable forest management and use of agricultural plant debris and other residues.
- Strengthening environmental controls of combustion plants using biomass
- Simplification and reduction of burdens of existing procedures for verifying the sustainability of solid biomass used in electricity generation. The biomass used in Spain is mostly of residual origin and is located close to consumption points, with a large number of small operators. This makes the verification of compliance with sustainability criteria in line with Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources a significant cost and administrative burden for the different actors operating along the value chain. The state of play of the verification of the sustainability and GHG emissions reduction criteria in Spain will be analysed with a view to identifying actions aimed at their simplification and improvement.

138 Resolution of 30 December 2020 of the Directorate-General for Environmental Quality and Assessment setting out the strategic environmental statement of the integrated National Energy and Climate Plan 2021-2030

- Prioritisation of heat networks over individual boilers in urban areas
- Raising awareness of the need to reduce agricultural burning and support for alternative destinations (composting and other)

d) Responsible

MITECO, AGE, Autonomous Communities

3.6.4. Synergies with other plans

Recovery and resilience facility

MEASURE 6.4 RECOVERY AND RESILIENCE FACILITY

a) Description

The European Council approved on 21 June 2020 the creation of the NextGenerationEU programme, the biggest economicstimulus ever financed by the European Union, in response to theunprecarious crisis caused by the coronavirus, involving EUR 750.000 billion in investment. Thanks to this instru, Europe will be greener, more digital and more resilient to the changes and challenges of the future.

90 % of these funds are articulated through the Recovery and Resilience Facility, regulated by Regulation(EU) 2021/241 of the European Parliament and of the Council of 12 February 2021, whose main objective is to provide Member States with financial support to achieve the milestones and targets of reforms and investments set out in their recovery and resilience plans.

Spain will access around EUR 160.000 billion between 2021 and 2026, of which about EUR 80.000 billion will be in the form of transfers. In order to channel these funds, Spain has drawn up the PRTR. All measures must comply with the 'do no significant harm to the environment' principle.

In the first phase of the PRTR, the plan envisaged allocating 39.7 % of these funds to the green transition, which was the main driver for implementing the plan, and confirming Spain's commitment to transforming the economy to promote a sustainable future. This first phase of the Plan is facilitating the historic deployment of autochthonousand new models such as energy communities, the transformation of urban space and the improvement of public transport in a coordinated manner with the creation of low-emission zones, the decarbonisation of indus, the energy renovation of neighbourhoods and buildings, the start-up of new vectors such as renewable hydrogen, or the development of energy storage.

The additional resources allocated by Spain under the Recovery and Resilience Facility that have not been mobilised in the first stage of the implementation of the PRTR are set out in the Addendum to the PRTR, makingthe process of recovery and modernisation of the Spanish economy nugatory, with the aim of strengthening thestrategic order of Spain and Europe in the energy, agri-food, industrial, technological and digital fields. The addendum, approved by the Council of Ministers on 6 June 2023 and approved by the European Commission and ratified by ECOFIN in October 2023, provides for an additional EUR 10.000 billion in grants and up to EUR 84.000 billion in loans. On energy, these resources are mainly concentrated ona new component, 31, called REPowerEU, and will allow, among others, to continuesupporting programs that have proven to be extremely successful, such as those related to self-consumption and storage behind the meter or renewable hydrogen, as well as to open new strategically important lines suchas those related to supporting the industrial value chain linked to the energy transition.

Between the two phases of the PRTR, around EUR 70.000 billion have been budgeted as contributors to the climate transition, of which EUR 32.000 billion are transfers (mainly grants) and EUR 38.000 billion are loans.

b) Objectives addressed

NextGenerationEU aims to respond in a joint and coordinated manner in the EU to the social and nomiccrisis caused by the global COVID-19 pandemic, and to help repair and counter the damage caused by the pandemic.

As a central element of this instrument, the Recovery and Resilience Facility aims to enhancethe economic, social and territorial cohesion of the Union by improving the resilience, crisis preparedness, adjustment capacity and growth potential of the Member States, mitigating the social and economic impact of that crisis, in particular on women. The mechanism has other complementary objectives that provide coherence and integrate other Union policies, such as implementing the European Pillar of Social Rights, accelerating the green transition, achieving the Union's 2030 climate targets and meeting the objective of climate neutrality by 2050; the digital transition. The actions resulting from the Facility shall contribute to the process of upward economic and social convergence, the restoration and promotion of sustainable growth and the integration of the economies of the Union, fostering the creation of quality jobs, andcontributing to the strategic autonomy of the Union.

The PRTR is the document drawn up by Spain to benefit from the Recovery and Resilience Facility, in accordancewith Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021, which governs the Recovery and Resilience Facility. The PRTR has a threefold objective: boost activity and job creationto stem the impact of the pandemic in the short term, support a process of structural transformation to increase potential growth in the medium term and strengthen resilience in the long term, moving towards amore sustainable and inclusive dawn. This Plan is structured around four cross-cutting axes, which will underpinthe trans-formation of the whole economy and are fully aligned with the EU's strategic agendas, the 2030 Agenda and the UN Sustainable Development Goals: the green transition, the digital transformation, gender equality and social and territorial cohesion. These four axes guide the ten levers that determine the country's future development, including policy levers I: Urban and rural agenda, anti-depopulation and agricultural development and III: Just and inclusive energy transition. Thus, the PRTR aims to accelerate the green transition as a key element in the short-term reconstruction phase and to act as a lever for the modernisation of the economy, thus generating greater resilience in the economy in the medium and long term.

With regard to the Addendum, it represents an update of the PRTR incorporating three new features: (1) allocate the additional transfers to Spain, involving additional subsidies of EUR 7.700 million; (2) allocate the loans from the Recovery and Resilience Facility, where Spain may request up to EUR 84.000 billion from the European Commission; and (3) allocate funds from the REPowerEU Plan, which aimsat Aho rrar energy, increase clean energy production and diversify Europe's energy sources.

c) Policy mechanisms

The PRTR is structured around 10 leveraged policies and 31 components that articulate a major reform and investment agenda with a horizon of 2026. Each component includes reforms and investments to which concrete milestones and targets are linked.

Specifically, in relation to this NECP, two of the levers have a direct link with the policies and measures described in Chapter 3 of this document. These are, in particular, policy levers I: Urban and rural agenda, combating depopulation and agricultural development, with EUR 14.407 million, and III: Just and inclusive energy transition, with a budget of EUR 6.385 billion. Specifically, thefollowing compacts are linked to this NECP:

-Lever policy I: Urban and rural agenda, combating depopulation and developing agriculture.

- Component 1: Sustainable, safe and connected mobility shock plan in urban environments and poltanusmetro
- Component 2: Housing rehabilitation and urban renewal plan

-Lever policy III: Just and inclusive energy transition.

- Component 7: Deployment and integration of renewable energy
- Component 8: Electricity infrastructure, promotion of smart grids and deployment of flexibility and energy storage
- Component 9: Renewable hydrogen roadmap and sectoral integration

- Component 10: Fair transition strategy
- Component 31: REPowerEU

Component 1, with a budget of EUR 6.536 billion, boosts the decarbonisation of urban mobility, the improvement of air quality and quality of life in cities, taking advantage of the economic, social and industrial opportunities associated with this transformation. To this end, it focuses on promoting active mobility and boosting the transformation of the public transport sector as a real alternative to the use of private vehicles, by supporting administrations in the investments needed for the provision of a digital and sustainable public transport system, the transformation of fleets towards zero- and low-emission vehicles, as well as digital traffic and mobilitymanagement. This component includes a shock plan with measures aimed at the city's own fabric and its infrastructure, as well as at enhancing and optimisingurban and metropolitan transport, including boosting the electrification of mobility and improving air quality.

The main objectives of Component 2, with a budget of EUR 6.820 million, are to encourage the redevelopmentof the building stock in Spain, in line with the Renovation of the European Wave, and to increase thenumber of social rental housing in energy-efficient buildings, contributing to the activation of this sector and the creation of jobs and activity in the short term. In addition, as a specific objective, the aim is to achieve significantly higher energy renovation rates than those currently in force, in order to bring forward compliance with the renovation targets set out in the National Energy and Climate Plan (NECP) and the long-term strategy for energy renovation in the building sector in Spain (ERESEE).

Component 7, worth EUR 3.165 billion, aims to increase the use of renewable energy on final energy consumption and seize the social and economic opportunity of this deployment, through the development of a clear and predictable regulatory framework that promotes private investment in renewables, strengthens social participation in this area and maximises the adequate environmental and social integration of renewables; thedevelopment and consolidation of the industrial value chain in the field of renewables; supporting the development and innovation in renewable generation technologies or the integration of renewable generation into end uses, and the development of skills and knowledge that contribute to harnessing the job opportunities of renewable development.

EUR 1.365 billion of Component 8 aims to secure the transformation of the energy system to ensure that it is flexible, robust and resilient so that it can be groundedon renewable energy. This will be done by promoting the progressive adaptation of network infrastructures, their digitalisation and the deployment of flexibility tools, such as storage, to ensure security and quality of supply.

Component 9, with EUR 1.555 billion in budget, aims to create a favourable environment for the development and deployment of renewable hydrogen as a key energy carrier for the future, around an innovative and knowledge-based industrial value chain based on SMEs, by supporting technology transfer, and the development of new business lines.

Component 10, with EUR 300 million, aims to minimise the economic and social impact of the transition to a green and low-carbon economy, which will entail the cessation of activities such as coal mining, coal-fired thermal power plants and nuclear power plants as their closure is agreed.

Component 31, REPowerEU, with a budget of EUR 6.916 billion (EUR 5.216 billion in transfers and EUR 1.700 billion in loans).The budget of this component is divided betweenthe PERTE ERHA amounting to almost 4.200 billion transfers and the PERTE Industrial Decarbonisation. Apart from new investments, it includes 1 specific reform regarding the permitting of renewable energy installations.

In addition to policy levers I and III, there are other components that are directly related to the measures and objectives of this plan. These include:

- Component 11: Modernisation of public administrations. The public administration's transformation axes include the energy transition of the administration, which takes the form of the renovation of its buildings and the use of renewable energies. It has a budget of EUR 1 070.7 million.
- Component 12: Industrial Policy Spain 2030. With a budget of EUR 3.782 million, it is committed to transforming Spain's industrial fabric, including decarbonising industry and improving the management of water, waste, energy and resources, emissions and renewable energy in the context of the circular economy. This component has also been reinforced by the addendum to the PRTR, with an additional EUR 100 million for recycling and reuse of equipment linked to the energy transition.

- Component 17: Institutional reform and capacity building of the national science, technology and innovation system. This component is directly linked to the research, innovation and competitiveness dimension of this plan, aiming to increase and accelerate investment in R & D & I in a sustainable manner and in strategic areas. It has a budget of EUR 2.689 billion.

Much of the actions included in the components are structured through the Strategic Projects for Economic Recovery and Transformation (PERTEs). These are the 12 Strategic Projects that have been approved:

- PERTE for the development of the electric and connected vehicle
- PERTE for cutting-edge health
- Renewable energy, renewable hydrogen and storage PERTE
- Agri-food PERTE
- PERTE New Language Economy
- PERTE Circular Economy
- PERTE for the shipbuilding industry
- PERTE Aerospace
- Time for digitalising the water cycle
- Microelectronics and semiconductors PERTE
- PERTE for the social economy and care
- Industrial decarbonisation PERTE

In particular, lever policy III and its components are listed in **PERTE ERHA**. This instrument will serve as a basis for the transformation of the productive fabric in the field of energy transition, in order to develop in our country the tools and instruments to address this transformation.

In addition, the PERTEs relevant to the green transition include the **PERTE VEC**, whichaims to strengthen the strategic autonomy, modernisation, decarbonisation and digitalisation of our self-motion sector; **The PERTE for Industrial Decarbonisation**, which aims to support industry in its transition towards more environmentally friendly processesand processes and contribute to their decarbonisation, the **Circular Economy PERTE**, which aims to accelerate the transition to a more efficient and sustainable production system for the use of raw materials; or the **PERTE for water digitalisation**, which encourages the use of new information technologies in the integrated water cycle, which will make it possible to improve water management, increase its efficiency, reduce losses in supply networks and progress towards meeting the environmental objectives set by water planning and international regulations.

d) Relationship and synergistic effect with the NECP

The NECP 2021-2 030 has provided the steering framework for the design of reforms and investments thatshape the PRTR related to the green transition, so that this plan levers a just green transition, developing the strategic capacities of the green economy. As pointed out by the European Commission in the positive assessment of the October 2020 NECP, the NECP has been a solid basis for the design of theRTRP's reforms and investments, in particular those labelled as investments for the green transition.

In the current context, it is essential to speed up actions linked to the energy transition, repurposing public and privateinvestment to reorient the production model, boosting decarbonisation,energy efficiency, the deployment and integration of renewables, the electrification of the economy, the development of energy storage, the circular economy, nature-based solutions and the improvement of theresilience of all economic sectors. The PRTR helps to accelerate this transition process.

The following table shows the synergies between the components of the PRTR and the different measures covered by this NECP.

e) Responsible

European Commission, General State Administration, Autonomous Communities and local authorities.

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC			1 Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas	2 Housing rehabilitation and urban renewal plan	3 Green and digital transformation of agri-food and fisheries industries	4 conservation and restoration of ecosystems and their biodiversity	5 Coastal conservation and water resources	6 Sustainable, safe and connected mobility	7 Renewable energies implementation and integration	8 Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage	9 Renewable hydrogen roadmap and sectoral integration	10 Fair transition strategy	11 Modernisation of Public Administrations	12 Industrial Policy Spain 2030	14 tourism sector modernisation and competitiveness plan	15 Digital connectivity, boosting cybersecurity and 5G deployment	17 Institutional reform and capacity building of the national science and innovation system	23 New public policies for a dynamic, resilient and inclusive labour market	28 Adapting the tax system to the reality of the twenty-first century	3
Descarbonización	1.1	Desarrollo de energías renovables compatible con la biodiversidad y la protección de los ecosistemas		■	■	■	■		■	■		■		■			■			■
	1.2	Desarrollo de energías compatibles con el territorio y el desarrollo rural							■	■										■
	1.3	Desarrollo de nuevas instalaciones de generación eléctrica de renovables							■	■							■			■
	1.4	Desarrollo de instalaciones de energías renovables innovadoras							■	■										■
	1.5	Almacenamiento energético								■	■									■
	1.6	Gestión de demanda y flexibilidad							■	■										■
	1.7	Adaptación de redes eléctricas para la integración de renovables							■	■										■
	1.8	Desarrollo del autoconsumo con renovables y la generación distribuida							■	■	■			■						■
	1.9	Desarrollo de nueva capacidad de almacenamiento hidroeléctrico							■	■										
	1.10	Descarbonización del sector industrial							■	■	■			■						■
	1.11	Marco para el desarrollo de las energías renovables térmicas		■					■					■						■
	1.12	Biocarburantes y otros combustibles renovables en el transporte	■					■	■		■			■			■		■	
	1.13	Descarbonización del transporte marítimo			■			■	■		■			■					■	
	1.14	Descarbonización del transporte aéreo						■	■		■			■						

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC

Decarbonisation

O
N

1.25 Estrategia de Transición Justa

1.26 Contratación pública de energía renovable

1.27 Formación de profesionales en el sector de las energías renovables

1.28 Revisión y simplificación de procedimientos administrativos

1.29 Generación de conocimiento, divulgación y sensibilización

I. Maintenance, safe and connected mobility shock plan in urban and metropolitan environments

2. Housing rehabilitation and urban renewal plan

3. Green and digital transformation of agri-food and fisheries industries

4. Ecosystems and biodiversity conservation and restoration

5. Coastal conservation and water resources

6 Sustainable, safe and connected mobility

7. Renewable energies implementation and integration

8. Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage

9. Renewable hydrogen roadmap and sectoral integration

10. Fair transition strategy

11. Modernisation of Public Administrations

12. Industrial Policy Spain 2030 14 Plan for the modernisation and competitiveness of the tourism sector

15. Digital connectivity, boosting cybersecurity and 5G deployment

17. Institutional reform and capacity building of the national science and innovation system

23. New public policies for a dynamic, resilient and inclusive labour market

28. Adapting the tax system to the reality of the twenty-first century

31 REPowerEU chapter

Componentes del PRTR y las
Decarbonisation
1.31 Análisis de ciclo de vida de los edificios
1.32 Reducción de emisiones de GEI en los sectores agrícola y ganadero
1.33 Reducción de emisiones de GEI en la gestión de residuos
1.34 Reducción de emisiones de GEI relacionadas con gases fluorados
1.35 Sumideros forestales
Energetic efficiency
1.36
1.37
2.1 Zonas de bajas emisiones y movilidad urbana sostenible
2.2 Cambio modal en transporte de mercancías con mayor presencia del ferrocarril
2.3 Renovación del material móvil de los medios de transporte por otros más eficaentes y de mejoras en la gestion
2.4 Mejora de la eficiencia energética de los puertos
2.5 Impulso del vehículo eléctrico
2.6 Mejoras en la tecnología y sistemas de gestión de procesos de industrias no energéticamente intensivas
2.7 Mejoras en la tecnología y sistemas de gestión de procesos de industrias energéticamente intensivas
1. Sustainable, safe and connected mobility shock plan in urban and metropolitan environments
2. Housing rehabilitation and urban renewal plan
3. Green and digital transformation of agri-food and fisheries industries
4. Ecosystems and biodiversity conservation and restoration
5. Coastal conservation and water resources
6. Sustainable, safe and connected mobility
7. Renewable energies implementation and integration
8. Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage
9. Renewable hydrogen roadmap and sectoral integration
10. Fair transition strategy
11. Modernisation of Public Administrations
12. Industrial Policy Spain 2030
14. Modernisation and competitiveness of the tourism sector
15. Digital connectivity, boosting cybersecurity and 5G deployment
17. Institutional reform and capacity building of the national science and innovation system
23 New public policies for a dynamic, resilient and inclusive labour market
28 Adapting the tax system to the reality of the twenty-first century
31 REPowerEU chapter

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC

Eficiencia energética

	2.8 Eficiencia energética en edificios existentes del sector residencial	2.9 Renovación del equipamiento residencial	2.10 Redes de calor y frío de distrito en el sector residencial	2.11 Eficiencia energética en la edificación del sector terciario	2.12 Redes de calor y frío de distrito en sector terciario	2.13 Eficiencia energética en equipos de generadores de frío y grandes instalaciones de climatización del sector terciario e infraestructuras públicas	2.14 Eficiencia energética en explotaciones agrarias, comunidades de regantes y maquinaria agrícola	2.15 Eficiencia energética en el sector pesquero	2.16 Promoción de los contratos de rendimiento energético	2.17 Sector público: responsabilidad proactiva y contratación pública eficiente energéticamente	2.18 Auditorías energéticas y sistemas de gestión energética	2.19 Formación de profesionales en el sector de la eficiencia energética	2.20 Comunicación de información en materia de eficiencia energética
1 Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas													
2 Housing rehabilitation and urban renewal plan	■	■	■		■	■			■		■		■
3 Green and digital transformation of agri-food and fisheries industries				■									
4 conservation and restoration of ecosystems and their biodiversity													
5 Coastal reservoir and water resources													
6 Sustainable, safe and connected mobility													
7 Renewable energies implementation and integration	■		■										
8 Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage			■										
9 Renewable hydrogen roadmap and sectoral integration													
10 Fair transition strategy								■			■		
11 Modernisation of Public Administrations						■							
12 Industrial Policy Spain 2030							■						
14 tourism sector modernisation and competitiveness plan			■										
15 Digital connectivity, boosting cybersecurity and 5G deployment		■											
17 Institutional reform and capacity building of the national science and innovation system													
23 New public policies for a dynamic, resilient and inclusive labour market												■	
28 Adapting the tax system to the reality of the twenty-first century	■												
31 REPowerEU chapter													

1. Sustainable, safe and connected mobility shock plan in urban and metropolitan environments
2. Housing rehabilitation and urban renewal plan
3. Green and digital transformation of agri-food and fisheries industries
4. Ecosystems and biodiversity conservation and restoration
5. Coastal conservation and water resources
6. Sustainable, safe and connected mobility
7. Renewable energies implementation and integration
8. Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage
9. Renewable hydrogen roadmap and sectoral integration
10. Fair transition strategy
11. Modernisation of Public Administrations
12. Industrial Policy Spain 2030
14. Modernisation and competitiveness of the tourism sector
15. Digital connectivity, boosting cybersecurity and 5G deployment
17. Institutional reform and capacity building of the national science and innovation system 23. New public policies for a dynamic, resilient and inclusive labour market

28 Adapting the tax system to the reality of the twenty-first century

Research, innovation and competitiveness

Internal energy market

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC	4.5 Plan de Desarrollo de la Red de Transporte de Energía Eléctrica 2021-2026	4.6 Integración del mercado eléctrico	4.7 Protección de los consumidores de electricidad e incremento de la competencia	4.8 Acceso de datos	4.9 Integración del mercado gasista	4.10 Protección de los consumidores de gas y gestión de la demanda	4.11 Mejora de la competitividad del sector gasista minorista	4.12 Corredor ibérico del Hidrógeno, H2MED	4.13 Mercados locales de electricidad	4.14 Nuevo diseño del mercado eléctrico	5.1 Acción Estratégica en clima, energía y movilidad	5.2 Implementación del SET-Plan	5.3 Planes Complementarios en los sectores de la energía y el clima	5.4 Infraestructuras científicas y técnicas en los sectores de la energía y el clima	5.5 Compra Pública de Tecnología Innovadora (CPTI) y Pre-comercial (CPP)	5.6 Fortalecimiento del capital riesgo público para la transferencia de tecnología en energía y clima
I. Sustainable, safe and connected mobility shock plan in urban and metropolitan environments											■					
2 Housing rehabilitation and urban renewal plan																
3 Green and digital transformation of agri-food and fisheries industries																
4 Ecosystems and biodiversity conservation and restoration														■		
5 Coastal conservation and water resources																
6 Sustainable, safe and connected mobility											■					
7 Renewable energies implementation and integration									■	■	■	■		■		
	■	■							■	■	■	■				
9 Renewable hydrogen roadmap and sectoral integration			■				■	■				■		■		
10 Fair transition strategy															■	■
8 Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage															■	■
11. Modernisation of Public Administrations															■	■
12. Industrial Policy Spain 2030																
14. Modernisation and competitiveness of the tourism sector																
15. Digital connectivity, boosting cybersecurity and 5G deployment																
17. Institutional reform and capacity building of the national science and innovation system		■														
23 New public policies for a dynamic, resilient and inclusive labour market																
28 Adapting the tax system to the reality of the twenty-first century																
31 REPowerEU chapter																
31 REPowerEU chapter																

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC		1 Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas	2 Housing rehabilitation and urban renewal plan	3 Green and digital transformation of agri-food and fisheries industries	4 conservation and restoration of ecosystems and their biodiversity	5 Coastal conservation and water resources	6 Sustainable, safe and connected mobility	7 Renewable energies implementation and integration		9 Renewable hydrogen roadmap and sectoral integration	10 Fair transition strategy	11 Modernisation of Public Administrations	12 Industrial Policy Spain 2030	14 tourism sector modernisation and competitiveness plan	15 Digital connectivity, boosting cybersecurity and 5G deployment		23 New public policies for a dynamic, resilient and inclusive labour market	28 Adapting the tax system to the reality of the twenty-first century	9 Energy infrastructures, promotion of smart networks and [illegible]
Research, innovation and competitiveness	5.7 Modificaciones normativas para facilitar la actividad investigadora e innovadora																		
	5.8 Fomento de la colaboración público-privada																		
	5.9 Centros de investigación de titularidad compartida en energías renovables																		
	5.10 Promover un polo de innovación sobe energías renovables, almacenamiento e hidrógeno en la Fundación Ciudad de la Energía, CIUDEN																		
	5.11 Mejorar la gobernanza y la coordinación del SECTI																		
	5.12 Proyectos Estratégicos para la Recuperación y Transformación Económica (PERTE) en transición energética																		
	5.13 Plataformas Tecnológicas y alianza ALINNE																		
	5.14 Potenciar la internacionalización de los agentes del SECTI en el ámbito de energía y clima																		
	5.15 Contribución española a la I+D+I para la energía de fusión																		
	5.16 Mission Innovation 2.0																		
	5.17 Mecanismos de financiación europeos de innovación en energía y clima																		
	5.18 Banco de pruebas regulatorio en el sector eléctrico																		
	6.1 Perspectiva de Género																		

deployment of flexibility and storage

17 Institutional reform and capacity building of the national science and innovation system

31 REPowerEU chapter

Sinergias entre las componentes de la Política Palanca III del PRTR y las medidas del PNIEC

Transversal

	6.2 Integración de los objetivos de adaptación al cambio climático	6.3 Integración de los objetivos del Programa Nacional de Control de la Contaminación Atmosférica	6.4 Mecanismo de Recuperación y Resiliencia	6.5 Fondo de Transición Justa	6.6 Fondo Social para el Clima	6.7 Política Agrícola Común	6.8 Política de Cohesión	6.9 Evaluación ambiental	6.10 Reto demográfico
1 Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas	■	■	■		■			■	■
2 Housing rehabilitation and urban renewal plan	■	■	■		■			■	■
3 Green and digital transformation of agri-food and fisheries industries	■	■	■			■		■	
4 conservation and restoration of ecosystems and their biodiversity	■	■	■	■		■		■	■
5 Coastal conservation and water resources	■		■			■		■	■
6 Sustainable, safe and connected mobility	■	■	■		■			■	
7 Renewable energies implementation and integration	■	■	■	■			■	■	■
	■		■						
9 Renewable hydrogen roadmap and sectoral integration		■	■	■				■	■
10 Fair transition strategy			■	■			■	■	■
11 Modernisation of Public Administrations			■						
12 Industrial Policy Spain 2030		■	■					■	
14 tourism sector modernisation and competitiveness plan	■		■						
15 Digital connectivity, boosting cybersecurity and 5G deployment			■						
			■					■	
23 New public policies for a dynamic, resilient and inclusive labour market			■						
28 Adapting the tax system to the reality of the twenty-first century			■						
		■	■	■				■	■

8 Electrical infrastructures, promotion of smart networks and deployment of flexibility and storage

17 Institutional reform and capacity building of the national science and innovation system

31 REPowerEU chapter

The Just Transition Fund

MEASURE 6.5 JUST TRANSITION FUND

a) Description

The Just Transition Fund is a novel instrument of the European Cohesion Policy, as for the first time it focuses its actions on concrete challenges, those arising from the just transition, and on specific territories, at province level or below.

In this framework, the European Commission adopted on 20/12/2022 the Territorial Just Transition Plan[139] and Spain's Just Transition Programme 2021-2027[140]. Both instruments, which have been developed in very close cooperation between the Just Transition Institute and the six Autonomous Communities concerned: Asturias, Galicia, Castile-Leon, Aragon, Andalusia and the Balearic Islands will make it possible to apply EUR 868 million of European aid, which will amount to around EUR 1.250 million in terms of total expenditure to be certified in the territories most affected by the energy transition.

Support from the Fund is expected to contribute to the creation of 6.000 jobs in these territories and to support more than 1.900 companies, mostly SMEs.

The definition of the contents of the Just Transition Fund through each Territorial Plan and Programme is based on the work initiated by Spain in 2018 on a just transition. The fight against climate change and the just transition is a top priority for Spain, as reflected in its Strategic Energy and Climate Framework structured in the following three pillars:

- law 7/2021 of 20 May 2003 on climate change and energy transition,
- the integrated National Energy and Climate Plan (NECP); and
- the Just Transition Strategy (JTS).

In the 2019 NECP target scenario, all coal-fired electricity generation was expected to cease by 2030. However, recent economic, technical and regulatory developments have led toall coal-fired thermal power stations in the country having already completed their closure, are in the process of being closed or are subject to medium-term closure plans, with the result that it is estimated that the total closure of coal could take place around 2025. As a result, all coal in Spain is expected to close within the time frameof the Just Transition Fund (2021-2027).

b) Objectives addressed

The objectives addressed by the Just Transition Fund in Spain build on the needs identified in the affected areas, proposing to extend, improve and complement the work started, based on previous work carried out in the country, with the following objectives:

- The JTF helps to complete the work started to deliver on the Just Transition Strategy objective that closures will generate a zero impact on employment and population in the medium term. To this end, it is proposed to support projects that have already emerged in the affected areas and to strengthen in particular the dynamic work being done to identify and accompany new projects in areas where it is most difficult to attract investment.
- In areas where companies with high industrial emissions are located in these territories because of their proximity to traditional energy resources (coal), the JTF will stimulate their process of decarbonisation and industrial renewal.

JTF interventions are structured around the following axes:

139 Spain's Territorial Just Transition Plan 2021-2027
140 Spain's Just Transition Fund Programme 2021-2027

- Green transformation of industry and promotion of sustainable mobility, circular economy and energy efficiency.
- Boosting the renewable energy value chain, self-consumption, energy storage and renewable hydrogen.
- Encouragement of SMEs and entrepreneurial projects for the economic diversification of territories.
- Fostering research, development and innovation (R & D & I), ICT integration and digital transformation.
- Environmental rehabilitation, nature conservation, biodiversity and ecosystems, promotion of historical heritage related to mining, and promotion of sustainable tourism.
- Boosting social infrastructure, the social economy and training and skills initiatives

c) Policy mechanisms

Support programmed under the Just Transition Fund will mostly be channelled through grants to private entities or transfers to public entities, where these have the role of beneficiaries, although financial instruments are also envisaged.

d) Relationship and synergistic effect with the NECP

The main relationship between the JTF and the NECP relates to Measure 1.25 Just Transition Strategy, which aims to anticipate and manage in a spirit of fairness and solidarity the consequences on districts and people directlylinked to technologies that will be progressively displaced as a result of the transition driven by the Plan.

The JTF will also complement, through the support projects developed with the JTF, the following measures:

- Measure 1.10. Decarbonisation of the industrial sector
- Measure 1.15. Development of biogas and biomethane
- Measure 1.16. Development of renewable hydrogen
- Measure 1.27. Training of professionals in the renewable energy sector
- Measure 1.29. Knowledge generation, dissemination and awareness raising
- Measure 1.30. European Emissions Trading System
- Measure 2.6. Improvements in technology and process management systems for non-energy intensive industries
- Measure 2.7. Improvements in technology and process management systems for energy-intensive industries
- Measure 2.18. Energy audits and energy management systems.
- Measure 2.19. Training of professionals in the energy efficiency sector
- Measure 2.20. Communication and information on energy efficiency
- Measure 4.2. Fight against energy poverty

Furthermore, it should be noted that Regulation (EU) 2021/1060 of 24 June 2021 setting outcommon provisions of the European Funds provides that for the specific objective ‘enabling regions and people to address the social, employment, economic and environmental impacts of the transition towards the Union’s 2030 energy and climate targets anda climate-neutral Union economy by 2050, based on the Paris Agreement’, the areas of intervention of any policy objective may be used. **The coefficient for the calculation of support to climate change objectives is set at 100 %** for all intervention areas used.

This takes into account the fact that the just transition is a necessary condition for the climate transition, and its tutionscontribute 100 %

to it.

e) Responsible

The JTF Managing Authority (Subdirectorate-General for ERDF Management of the Directorate-General for European Funds within the Ministry of Finance) has delegated part of its tasks to the Due Bodies, which will be, in addition to the Institute for the Just Transition, O.A., the entities designating the Communitieswith territories eligible for the JTF: Asturias, Castile-Leon, Aragon, Galicia, Andalusia and the Balearic Islands.

These intermediate bodies will manage their share of the Just Transition Fund. The distribution has been made following the same criteria as the JTF Regulation used to distribute the allocations among the Member States according to the following table:

Territory	JTF support	%
Palencia	71.558.029	8.24 %
Leon	125.517.602	14.45 %
Castilla and León	**197.075.602**	**22.69 %**
Cadiz	69.631.757	8.02 %
Cordoba	32.160.979	3.70 %
Almeria	51.817.002	5.96 %
Andalusia	**153.609.739**	**17.68 %**
Asturias	261.850.921	30.26 %
Asturias	**261.850.921**	**30.26 %**
Teruel	91.703.862	10.56 %
Aragon	91.703.921	**10.56 %**
A Coruña	111.380.018	12.82 %
Galicia	**111.380.018**	**12.82 %**
Zone TJ Alcudia	17.374.897	2.00 %
ITJ	34.749.795	**2.00 %**
TOTAL JTF	**868.744.863**	**100.00 %**

Furthermore, the audit authority of the programme will be carried out by the Intervención General de la Administración del Estado (IGAE), the Ministry of Finance. The body to receive payments from the Commission shall be the SubdirecGeneral for Economic and Financial Affairs of the European Union of the Secretariat of the Treasury and International Finance of the Ministry of Economy, Trade and Enterprise. The accounting function will be carried out by the SubbDirectorate for Certification and Payments of DG European Funds, which is also part of the Ministry of Finance.

Social Climate Fund

MEASURE 6.6 SOCIAL CLIMATE FUND

a) Description

The increased climate ambition at European level in the Fit for 55 package meansincreasing the contribution of all sectors to GHG emissions mitigation. The Fit for 55 package therefore amends the Emissions Trading System (ETS), extending this scheme to fossil fuels consumed in the building sector, the road transport sector and otheradditional sectors not covered by the current ETS, thus providing an economic incentive for cost-effective emission reductions in these sectors that have so far been difficult to decarbonise. In accordance with Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023,[141] this new system will beintroduced for the year 2027.

However, as noted in the Directive, the introduction of the carbon price in these sectors can have significant social and distributional impacts that could disproportionately affect vulnerable HGARs, micro-enterprises andvulnerable transport users, who spend a larger part of their revenues on energy and transport, and who, in certain regions, do not have access to affordable mobility solutions and alternatives to private vehicles either. In order to address these impacts, the establishment of the Social Climate Fund (SCF) has also been agreed by Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amendingRegulation (EU)[142]2021/1060. The SCF, which is scheduled to run for the period 2026-2032, will be financed from part of the revenues from the new ETS2. The total amount of the Fund shall be up to EUR 65.000 million.

For its part, Spain will have to draw up a Social Climate Plan (Social Climate Plan), which sets out the measures and investments to cushion the social and distributional impacts of the MSD2 on the most vulnerable. The PSpC may include,among others, actions on energy efficiency, renovation of buildings, decarbonisation of heating and cooling systems in buildings, promotion of zero- and low-emission mobility and transport, as well as temporary and limited direct income support.

The Fund will be financed from the EU budget. In addition, each Member State should also contribute at national level to the PsPC budget, from its own budget with a co-financing value of at least 25 %. As mentioned above, the Social Climate Plan may finance different types of actions and, on a temporary and limited basis, may grant direct income support.

The potential social and distributional impact of these measures, both of the implementation of the MSD2 and of the PSpC to compensate for the inequalities caused by the previous one, makes it necessary to carry out a prior analysis exercise, which, in accordance with Regulation (EC) No 2023/955, must be included in the PSCs.

b) Objectives addressed

The Social Climate Fund aims to mitigate the impact caused by the increase in the price offossil fuel fuels that will be triggered by the extension of the ETS to fuels used in buildings, and road transport, benefiting vulnerable households, micro-enterprises and transport users – in parkto households in energy poverty or transport poverty – and who do not have access toaffordable solutions. The CSF thus contributes to addressing the societal and distributional challenges of the EU's green transition.

c) Policy mechanisms

- Drawing up the Social Climate Plan in line with the achievement of European and Spanish climate and energy objectives. In its preparation, as referred to in Article 5 of Regulation (EU) 2023/955, a public consultation shall be carried out with local and regional authorities, representatives of economic and social partners, relevant civil society organisations, youth organisations and other stakeholders. The

141 Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme

142 Regulation (EU) No 2023/955 of THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) No 2021/1060

measures included in the Plan shall contribute to mitigating the effects of the extension of the ETS to vulnerable households, micro-enterprises and transport users, with a particular focus on people in energy poverty.

- The analysis included in this Plan in Chapter 4 of Impact Analysis of policies and measures and other complementary reports will serve as a basis for the design of the measures, with the aim of ensuring that the measures have a redistributive effect and mitigate the negative effects of the extension of the ETS.
- In the design of the PSpC, special attention will be paid to the effects on the countryside, so that the NECP measures can generate benefits in the territory. In addition, it is of particular importance to implement measures to promote and improve connectivity in the rural environment.

d) Relationship and synergistic effect with the NECP

The NECP, as a general framework for the energy transition in Spain, includes the set of standard actions that could integrate Spain's future Social Climate Plan: energy efficiency, renovation of buildings,carbonisation of heating and cooling systems in buildings and promotion of zero- and low-emission mobility. Please find below some of the measures in this Plan that could be transposed, withthe appropriate clarifications, to the Social Climate Plan:

□ Building sector

- Measure 1.8. Development of self-consumption with renewables and distributed generation
- Measure 2.8. Energy efficiency in existing buildings in the residential sector
- Measure 2.9. Renewal of residential equipment

† Road transport sector

- Measure 2.1. Low-emission zones and sustainable urban mobility
- Measure 2.2. Modal shift in freight transport with a higher presence of rail
- Measure 2.3. Renovation of rolling stock of means of transport with more efficient ones and improvements in management
- Measure 2.5. Promotion of electric vehicles

In addition, Measure 4.2 deserves specific mention. Fight against energy poverty and its implementation through the National Energy Poverty Strategy 2019-2024. Interventions in householdsin energy poverty have higher aid intensities.

(e) Responsible

The General State Administration and the Autonomous Communities and which falls within their competences.

Common Agriculture Policy

MEASURE 6.7 COMMON AGRICULTURAL POLICY

a) Description

On 31 August 2022, the European Commission approved Spain's CAP Strategic Plan (CAP Strategic Plan), one of the first Member States to obtain approval of the plan.

For the first time, there is a single strategy covering all CAP interventions, implying greater coherence between them. In addition, this reform

has given more flexibility to adaptthe CAP to the national and regional specificities of the Member States.

This Plan therefore represents a unique opportunity, through the set of interventions, to address the necksof the agricultural sector and the Spanish countryside as a whole, even beyond the instruments of the CAP itself.

b) Objectives addressed

The CAP Strategic Plan 2023-2027 aims at the sustainable development of agriculture, foodand rural areas to ensure the food security of society through a competitive sector and a living rural environment.

The agri-food sector presents challenges and challenges which, if not properly addressed, can erode the sector's competitiveness (job losses, loss of economic activity in rural areas andfood supply capacity) and threaten the environmental sustainability of both the sector and the country. The CAP Strategic Planaims to address the needs identified.

In relation to environmental and climate challenges, the CAP Strategic Plan will address the environmentalneeds identified therein and contribute to the achievement of the specific environmental objectives, which are:

- Contribute to climate change mitigation and adaptation, including by reducing greenhouse gas emission and enhancing carbon sequestration, as well as promote sustainable energy
- Promote sustainable development and efficient management of natural resources such as water, soil and air, including the reduction of chemical dependency.
- Contribute to halting and reversing biodiversity loss, enhancing ecosystem services and preserving habitats and landscapes.

The needs identified for these specific objectives are strongly linked tothe European Pact and its Farm to Fork and Biodiversity Strategies for 2030, and also to theFit for 55 legislative package.

This increased environmental and climate ambition has budgetary support as Spain estimates that approximately 43 % ofthe total CAP Strategic Plan budget will contribute to environmental and climate objectives. On the basis of the baseline represented by enhanced conditionality, the CAP Strategic Plan wishes to incentivise production changes through additional voluntary payments both of a national nature (eco-schemes) and of autonomous community design (primarily aid for environmental and climate commitments, but also other measures under EAFRD).

c) Policy mechanisms

The following specific mechanisms are provided for in the CAP Strategic Plan, which will have a synergistic effect with the NECP:

- Support for active farmers or groups of active farmers who undertake, on a voluntary basis, to observe certain agricultural practices beneficial for the climate, the environment and animal welfare (eco-schemes).
- Aid to farmers or other beneficiaries who undertake management commitments on a voluntary basis.
- Support for investments under the additional conditions and specifications set out in the CAP Strategic Plan.
- Support for cooperation under the additional conditions and specifications set out in the CAP Strategic Plan.

d) Relationship and synergistic effect with the NECP

The Common Agricultural Policy interventions contributing to the achievement of the objectives of the NECP relating to the reduction of GHG emissions in the agricultural and livestock sectors and the increase of agricultural sinks are as follows:

- Eco-scheme Carbon farming and agroecology: Rotations and direct sowing on non-irrigated arable land.
- Eco-scheme Carbon farming and agroecology: Rotations and direct sowing on wet non-irrigated arable land.

- Eco-scheme Carbon farming and agroecology: Rotations and direct sowing on irrigated arable land.
- Eco-scheme Carbon farming: Inert green roofs and roofs in woody crops on high slope land.
- Eco-scheme Carbon farming: Inert green roofs and roofs in woody crops on medium-gradient land.
- Eco-scheme Carbon farming: Inert green roofs and roofs in woody crops on flat land.
- Eco-scheme Carbon farming and agroecology: Extensive grazing, mowing and biodiversity in the areas of wet pasture.
- Eco-scheme Carbon farming and agroecology: Extensive grazing, mowing and biodiversity in the areas of Mediterranean Pastes.
- Agri-environmental commitments in agricultural areas. Commitments to promote and sustainably manage pastures.
- Agri-environmental commitments in agricultural areas. Practices for soil improvement and combating erosion.
- Forest management commitments, for the proper management of forest areas and their use.
- Commitments to maintain afforestation and agroforestry systems.
- Agri-environmental management commitments in organic farming.
- Support for non-productive investments on agricultural holdings linked to mitigation – adaptation to climate change, efficient use of natural resources and biodiversity.
- Non-productive forestry investments in afforestation and agroforestry systems.
- Non-productive forest investments in restoration of forest damage.
- Non-productive forestry investments in forestry actions with environmental objectives.

Common Agricultural Policy interventions that also contribute to achieving the objective of the NECP on improving energy efficiency in farms, irrigation communities and agricultural machinery, and the promotion of renewable energies:

- Support for productive investments on agricultural holdings linked to contributing to climate change mitigation – adaptation, efficient use of natural resources and animal welfare.
- Aid for investments with environmental objectives in the processing, marketing or development of agri-food products, for investments in improving energy efficiency primarily for environmental purposes, in the recovery of waste and materials of agricultural origin to increase energy self-sufficiency and for the uptake of renewable energy sources in industry.
- Aid for investments in irrigation infrastructure with environmental objectives, promoting the use of renewable energy sources and improving the energy efficiency of installations.
- Non-productive investments in basic services in rural areas, for infrastructure improvement

e) Responsible

General State Administration and Autonomous Communities.

Cohesion Policy

MEASURE 6.8 COHESION POLICY

a) Description

With a total allocation of EUR 35.562 billion, Spain is the third largest beneficiaryof EU cohesion polí funds in 2021-2027, only after Poland and Italy. This allocation is spread over EUR 23.397 billion from the European Regional Development Fund (ERDF), EUR 11.296 billion from the European Social Fund Plus (ESF +) and EUR 869 billion from the Just Transition Fund (JTF).

The 2021-2027 cohesion policy funds complement and at the same time reinforce and strengthen,from a territorial cohesion perspective, the strong structural reform and transformative investment agenda of the PRTR.

Spain's Partnership Agreement (AA) for the 2021-2027 programming period constitutes a broad and flexible framework agreement that provides coverage for all programmes designed under the different cohesion policy funds and sets out the broad strategic orientations with which all programmes are aligned.

b) Objectives addressed

The pre-programming analysis, combined with the partnership process, has made it possible to make a diagnosis ofinvestment cesities on which the programming of the various instruments has been based. The broad lines of action that have defined the programming of cohesion policy funds are well aligned with the national transformative agenda and EU priorities – called policy objectives (POs) in the regulatory framework of cohesion policy.

The second of these POs focuses on the green transition and pays particular attention to the energy transition towards a net-zero carbon economy. In this area, the NECP is set as the backbone of the design of the actions in the period 2021-2027. The interventions collected by the various cohesion policy instruments in this area are also well aligned with the broad guidelinesset out by the European Green Deal, and with the subsequent developments in both the Sustainable Ob55 package and the REPowerEU Plan, and the Commission's Communication "A Renovation Wave for Europe". Investments in the energy transition are shaped around three specific objectives: the promotion of energy efficiency; the promotion of renewable energies, and the development of smartenergy overcrowding systems, grids and equipment.

c) Policy mechanisms

Resources in the field of energy transition are generally articulated and channelled either through direct implementation by governments or in the form of aid for private investment. In some cases, work is ongoing on the design of financial instruments to provide support, either bytaking equity participation in innovative projects or companies, or through loans or guarantees.

d) Relationship and synergistic effect with the NECP

Energy efficiency is the first priority for action to advance the decarbonisation of the energy system and, in line with the long-term strategy for energy renovation in the building sector in Spain (ERESEE), cohesion policy funds provide for energy renovation actions for both residential and non-residential buildings and both public and private buildings.

On the administration side, investments will be made to improve energy efficiency and the use of renewable energy sources in buildings and public infrastructure that consume energy, taking into account the significantdemonstrative effect of these actions. In addition, measures are planned to support the energyrenovation of the private housing stock, which may complement interventions from other funds focusing on-tackling energy poverty, and to support energy efficiency in enterprises – primarily SMEs – as well as support for the development of advisory networks and/or energy services.

In all programmes, the aim will be to prioritise interventions involving deep renovations and to concentrate actions on the buildings and infrastructure with the highest potential for energy savings, seeking, as far as possible, to ensure a minimum level of significant energy savings from renovations. In addition, priority will be given to interventions that may have an integrated nature, for example combining energy efficiency actions with the deployment of renewables.

On the other hand, in the field **of renewable energy deployment**, investments will seek to concentrate support on projects for the development

and deployment of non-traditional and innovative renewables, whose profitability is far from that of more mature technologies, such as renewable gases. This includes supportfor biogas production, support for green hydrogen or support for biomass projects.

In any event, as a result of the urgency of accelerating the deployment of renewable energy production, there is also provision for the possibility of formulas to support the massive deployment of larger renewables.

On the other hand, projects are planned to facilitate citizens' participation in the gene transition, including projects aimed at promoting self-consumption in the various areas of the economy, supporting the development of energy communities in their different versions, as well as the development of small-scale storage (behind the meter).

Finally, it is envisaged to develop actions to promote the full incorporation of renewableenergies in different sectors. In relation to the building sector, measures are planned to incorporate thermal renewables for heating and cooling in both the residential and non-residential sectors and, both in the residential andprivate sectors. Projects aimed at promoting the decarbonisation of the transport sector through the proper integration of renewable energy into the transport sector are also envisaged.

Finally, there is also a possibility for cohesion policy instruments to finance actions in the field of deployment and technological upgrading **of energy transmission and distribution networks** and large-scale **energy** storage, with a view to adapting the system to the requirements needed to implement the energy transition (i.e. integration of renewable energies, progressive electrification of energy end uses) and better monitoring, monitoring and, ultimately, managemability. In addition, the possibility of supporting the development of new business models contributing to demand-side management, storage services or new technologies implemented in the sector is envisaged.

e) Responsible

In the case of multi-regional programmes, the programme authorities are in the General State Administration, whereas for regional programmes they are located in the Autonomous Communities.

3.6.5 Environmental assessment of the NECP

Reference framework

The update of the 2023-2030 NECP is subject to the strategic environmental assessment procedure laid down in Law 21/2013 of 9 December on environmental assessment (hereinafter Law 21/2013). This assessment is understood as a prevention tool that allows the integration of environmental aspects into the decision-making of public plans and programmes. This process involves carrying out the mandatory public consultations and information, following onfrom a comprehensive and integrated Strategic Environmental Study and culminating in the Strategic Environmental Declaration.

For the NECP 2021-2030, the process of drafting the Strategic Environmental Assessment included the initiation request; public consultation of the public administrations (public authorities) affected and interested persons by the environmental body, giving rise to the corresponding scope document issued by the Directorate-General for Biodiversity and Environmental Quality; and the publication of the Strategic Environmental Study of the PNIEC 2021-2030 on the website of the Ministry for the Ecological Transition and the Demographic Challenge as a public information phase and consultation of the affected public authorities and interested persons.

As a result of the environmental assessment procedure, following the relevant public consultations and information, and in response tocomments from entities, public administrations concerned and interested persons, on 30 December 2020, the Decision of the Directorate-General for Environmental Quality and Assessment was issued setting out the StrategicEnvironmental Section (EAD) of the 2021-2030 Integrated National Energy and Climate Plan.

The implementation of the 2021-2 030 NECP has made remarkable progress, also thanks to the positive impact of initiatives such as the Recovery,

Transformation and Resilience Plan (RRP), which have boosted the transition to a greener and more sustainable economy and demonstrated its effectiveness as an instrument for meeting energy and climate commitments. However, the increased climate ambition at European level and legislative initiatives such as 'Fit for 55' and 'REPowerEU' have set higher targets for reducing emissions, promoting renewable energy and improving energy efficiency. These developments have led to the need to revise and update Spain's National Energy and Climate Plan (NECP) to ensure that national energy strategies are aligned with EU and global objectives, while strengthening the country's energy autonomy.

On 28 June 2023, Spain submitted to the European Commission the draft update of the 2023-2030 NECP for assessment, and on the same date it was submitted for public consultation between 28 June and 4 September 2023. In addition, during April and May 2023, 'Working Days for the Update of the National Energy and Climate Plan' were held around sessions developed as a forum for listening and dialogue, in order to highlight-the different contributions and views of various actors representing multiple sectors and areas of the economy, related to the NECP, including representatives of civil society. In March 2024, a 'listening and participation days: Renewable energy and territory".

On 18 December 2023, the European Commission issued its assessment of Spain's draft update of the2030 NECP, highlighting positively the acceleration of renewable energy deployment and efforts to strengthen security of energy supply. In addition, the ambition shown in the production of renneting gases andthe development of energy storage systems, key elements to ensure a sustainable energy transition, was assessed.

The strategic environmental assessment procedure for updating the 2023-2030 NECP began on 12 February 2024, by submitting the application to the Directorate-General for Environmental Quality and Assessment. On 18 April 2024, the scope document containing the guidelines, comments and input from the administrations andstakeholders consulted for the preparation of the Strategic Environmental Study of the PNIEC 2023-2030 was received.

With the scope document as the basis, the Strategic Environmental Study (SEA) was drafted. In accordance with Articles 21 and 22 of Law 21/2013, the ESAE of the update of the PNIEC 2023-2030 was published on 11 June 2024 on the website of the Ministry for the Ecological Transition and the Demographic Challenge, opening the period of public information and consultation of the public administrations concerned and interested persons.

As a result of the environmental assessment process, after incorporating the comments into the public participation processes, on 9 September 2024, the Decision of the Directorate-General for Environmental Quality and Assessment was issued setting out the Strategic Environmental Declaration (SEA) of the Update of the Integrated National Energy and Climate Plan 2023-2030. The**DAE decides that the update of the 2023-2030 NECP**, incorporating the environmental measures and recommendations set out in the ESAE, together with the environmental determinations incorporated therein, **will not have any significant impact on the environment.**

Strategic Environmental Study

The Strategic Environmental Study sets out, across different chapters, the general characteristics of the NECP; the environmentalpolicy relevant to the Plan; the environmental protection objectives to be covered; the criteria underlying the policy option adopted in the NECP; significant environmental effects resulting from its implementation; the preventive, corrective and compensatory environmental measures to accompany the deployment of the policies andmeasures taken from the Plan; and the environmental monitoring programme.

The Strategic Environmental Study of the update of the NECP for the period 2023-2030 focuses mainly on the changes that this update entails in the planning framework. Among the most significant potential environmental impacts resulting from the update of the NECP, it should be noted that the main changes compared to the previous NECP result directly from the increased climate ambition to protect the environment and the resultingincrease in much of the targets. This results, among other things, in increased penetration of renewable technologies, increased energy efficiency in industry, mobility or buildings, and electrification of energy end-uses.

Specifically, Chapter 9 of the Strategic Environmental Study for the update of the 2023-2030 NECP details the environmental measures and recommendations envisaged to improve the environmental integration of the NECP at the level of theNECP.

a) **Environmental measures for the development and deployment of NECP policies and measures compatible withthe serving of**

biodiversity, the environment and life

The analysis of the interactions of the NECP's policies and measures with the environment requires the identification and classification ofthe main components of the NECP according to their form of interaction with the territory and the environment.

Chapter 9 of the strategic environmental study of the update of the NECP 2023-2030 sets out best environmental practicesfor the deployment of the various technologies, with the aim of ensuring that projects include environmental measures that are preventive, corrective and compensatory, in order to reduce the effects on the environment.

The preventive and corrective measures included in the ESEA and supplemented in the EAD are divided into:

- Policy measures: they list general and strategic environmental criteria for renewable energy deployment and include the actions implemented by the substantive body.

- Recommendations at project level: good environmental practices for administrations and project promoters derived from the NECP to take into account in their planning and implementation.

Among the policy measures is the specific case of the **promotion of general environmental criteria for renewable energy installations**. MITECO has planned instruments to promote the environmental adequacy of the location of the facilities. These include the production, publication and dissemination of environmental Zonification maps for renewable energies: Wind and Photovoltaic143.

The strategic measures proposed by the ESEA are grouped into 3 categories:

- Cross-cutting actions
- Deployment and integration of renewable energy
- Sectoral transformations

Cross-cutting actions include the development of economic, social, territorial and knowledge actions or transformations aimed at promoting the energy and climate transition that are not linked to specific technologies or sectors. As part of these actions, the ESAE proposes the incorporation of research lines in the field of biental environmentthat improve the environmental integration of the NECP measures and the promotion of carbon footprint and circular economy compensation initiatives, coordination of the NECP with national plans and programmes and a gender perspective. The measures under this category have no negative impacts and many of them seek to improve the territorial or social integration of the NECP.

The deployment and integration of renewable energy, especially electricity generation, has a greaterstrategic impact. This entails transformations with the greatest territorial and environmental impact of the Plan, including potential negative environmental effects that need to be prevented or corrected, including recommendations on good environmental practices that mitigate and eliminate these potential effects, with the aim of making the deployment of these technologies compatible with the territory, biodiversity and rural development.

Specifically, the environmental integration measures and recommendations proposed in the ESAE for this category of measures in the NECP are the promotion of general and technology-specific environmental criteria (wind, photovoltaic, thermosolar, hydro-energytrica, geothermal, marine, biomass, biogas and biofuels) for the location of renewable energy installations; for theprovision of renewables in the electricity system and for the progressive reduction of energy from non-renewable sources.

Policy measures for **sectoral transformations** address transformations with an impact ontransport, residential and services, industry, agriculture, forestry, waste and renewable gases.

Preventive, corrective and compensatory measures for potential negative effects are based on the identification of potential environmental impacts resulting from the implementation of the policies and measures of the NECP. Therefore, when implementing and deploying the actions resulting

143 Environmental zoning for renewable energy: Wind and Photovoltaic

from the policies and measures proposed in Chapter 3 of the NECP, it will be necessary to take into account the Strategic Environmental Study, which includes the measures necessary to ensure compliance with environmental protection objectives. The aim is to establish the necessary measures to prevent and reduce the potential negativeefec resulting from the implementation of the NECP, as well as to take advantage of the opportunities offered by the Plan itselfto promote improvements in the environment.

The environmental study concludes that **the overall effects of updating the NECP show a very favourable environmental balance**, on the one hand, because of its significant positive effects in terms of emissions mitigation and combating climatecam, which benefit a wide range of resources and values, both ecological and socio-economic; on the other hand, it is possible to mitigate their potentially negative effects by ensuring compliance with the established environmentalstandards and objectives, thanks to both environmental legislation and specific measures incorporated in the Plan.

b) **Environmental Monitoring Programme**

The purpose of the **Environmental Monitoring Programme** (PVA) is to monitor the effects on the environment of themeasures provided for in the NECP, verifying the effectiveness of the preventive and corrective measures included in the Strategic Environmental Study and the Environmental Assessment Declaration and adapting them where appropriate. As established in both the ESAE and the EAD of the PNIEC 2021-2030, this monitoring is being carried out in accordance with the environmental monitoring measures and indicators proposed in both documents. In the ESAE of the update of the 2023-2030 NECP, the PVA has been included, updating the indicators included in the first period of the NECP on the basis of the results of the first PVA report of the PNIEC 2021-2030. In addition to this, new indicators proposed in the EAD of the NECP 2023-2030 are added.

In addition, following the recommendations of the 2021-2030 EAD, working groups were set up to draw up **guides togood practice** that systematise all environmental criteria, including the possibility of proposing common criteria that serve as a reference for the legislation of the Autonomous Communities and the respective municipal ordinances. In particular, the EAD of the PNIEC 2021-2030 suggested that guides be drawn up to address these specific aspects in order to systematise the environmental criteria in the deployment of renewables:

- **Guides to good practice** reflecting the practices to be developed for proper soil conservation and improvement, both for the environmental restoration of the areas occupied by the deployment of renewable energy installations, and for the dismantling of thermal and nuclear plants.
- **Guide to environmental guidelines on the deployment of renewable energy in the marine environment** or the construction/installation of infrastructure associated with the NECP measures in the marine environment.
- **Methodological Guide for the Evaluation of Wind Parks in the Marine Environment**
- **Guide for the integration of self-consumption and distributed generation renewable installations in the urban landscape and rural areas**, in order to develop common criteria that serve as a reference for the legislation of the Autonomous Communities and the respective municipal regulations.
- **Guide for the integration of energy renovation and self-consumption facilities in historical and cultural heritage buildings** and their surroundings, as well as in the buildings of declared monumental sets.
- **Methodological guide** for the preparation of studies assessing the synergistic and cumulative effects ofinjections from renewable energy installations.

To address the above topics, the following guides have been published to date, which address most of the aspects outlined above:

Table 3.5. Good practice guides developed

Guide	Date of publishing

Guide for the preparation of environmental impact studies for solar photovoltaic projects and their disposal infrastructure[144]	March 2022
Guide for the implementation of the integrated national energy and climate plan at local level[145]	October 2021
Guide to guidelines for municipalities to promote self-consumption[146]	October 2023
Guide to good practice for the installation of infrastructure and equipment related to renewable energy and their potential impact on cultural heritage[147]	November 2022
Recommendations for launching a local energy community[148] [149]	March 2023
Methodological guide for assessing the impact of solar installations on [100] **species steppe avifauna**	July 2021

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In addition to the guides indicated in the table above, progress has been made on the date on which the 2023-2030 NECP update was drawn up to address the other topics. The 'Logical Guidefor the Environmental Assessment of Wind Parks in the Marine Environment' and the 'Methodological Guide for the drafting of studies to assess the synergistic and cumulative effects of renewable energy installation projects', the 'Guide to good practice for the integration of fauna conservation into the design and evaluation ofsolar photovoltaic plans and associated environmental measures' and the 'Guide for the preparation of environmental impact studies for wind energy infrastructure projects' are currently being drafted. Specific sessions to address the cumulative and synergistic effects of the concentration of renewable installations in the framework of the Network of Environmental Authorities should be highlighted. This network involves administrations responsible for European funds and the environment at various levels, including the European Commission, the General State Administration and Autonomous Communities and cities.

The EAD issued on the basis of the strategic environmental assessment of the updated PNIEC 2023-2030 calls forthe development of methodological guides to address aspects that are considered significant in order to contribute to the correct environmental integration of the measures implemented by the NECP.

Outcome of the environmental assessment

Against the backdrop of accelerating the energy transition in response to the increased climate ambition at euro level, the necessary achievement of the objectives has been balanced at all times with an environmental guarantee, as a result of the assessment, analysis and exchange of information with developers, administrations and different entities involved in the environmental assessment process.

The update of the NECP 2023-2030 incorporates the EU's recommendations to align it with climate objectives. Solutions such as the coherence of the plan with hydrological planning and the protection of biodiversity have been proposed, as well as integration measures for sectors such as fisheries, ensuring that they are compatible with the development of renewable energies. In addition, it is planned to improve environmental monitoring and incorporate specificindicators, thus strengthening the country's sustainability and decarbonisation framework.

The PNIEC's commitment to greater penetration of renewable technologies, accompanied by an increase in energyscience in industry, mobility or buildings and the electrification of energy end uses in order to achieve the climate objectives, does not mean reducing the environmental constraints imposed on the development of the projects necessary for this purpose. Therefore, from an environmental perspective, the NECP prioritises decarbonisation and geneefficiency through an approach that respects biodiversity and promotes sustainability. The most prominent measures includethe development of renewable energies compatible with the protection of ecosystems (*measure 1.1*) and rural territory (*measure 1.2*), as well as the decarbonisation of the maritime and aviation sectors (*measures 1.13 and 1.14*). The use of biogas and biomethane (*measure 1.15*) is also boosted, together with the creation of new sustainable business models (*measure 1.19*).

144 Guide for the preparation of environmental impact studies for solar photovoltaic plant projects and their assessment infrastructures
145 Guide for the implementation of the integrated national energy and climate plan at local level
146 Guide to guidelines for municipalities to promote self-consumption
147 Guide to good practices for the deployment of renewable energy infrastructure and equipment and their potential impact on cultural heritage
148 Recommendations for launching a local energy community
149 Methodological guide for assessing the impact of solar installations on steppe avian species

Energy efficiency is promoted through modal shift towards rail (*measure 2.2*), modernisation of means of transport and ports (*measure 2.3*), and public sector responsibility in efficient energy procurement (*measure 2.17*). In addition, environmental training and awareness-raising (*measures 1.27 and 1.29*) are promoted, which are key to strengthening citizenship committed to the green transition.

In terms of energy security, plans such as + *Energy Security* (*measure 3.1*) are reinforced and alternative fuel recharging points are established (*measure 3.4*), with a particular focus on contingency and cybersecurity in the sector (*measure 3.9*).

Finally, the Plan also works on improving consumer protection and combating energy poverty(*measures 4.1, 4.7, 4.2 and 4.10*).

Finally, in the area of research, innovation and competitiveness (*Dimension 5*), the NECP prioritises research into renewable energy and clean technologies, which is essential for maintaining Spain's technological leadership in thisarea. Similarly, the *Transversal Dimension* (*Dimension 6*) ensures that all sectors work in an aligned and coordinated manner to move towards a more efficient, fairer and sustainable energy system.

As a result of the environmental assessment procedure, a measure covering the key aspects of the strategic environmental assessment of the update of the 2023-2030 NECP is incorporated into the NECP. However, in the environmental ASPECrelating to the implementation of the NECP, account will be taken of everything included in both its SPEs and the issues raisedin the EAD (both in the PNIEC 2021-2030 and in the update of the NECP 2023-2030).

Some environmental aspects of particular importance are highlighted below:

- Boosting renewable energy projects does not mean reducing the environmental constraints imposed on the deployment of such infrastructure. A renewable energy project must be subject to an environmental assessment procedure and must have a favourable environmental impact statement (DIA) or afavourable biental report, depending on the corresponding environmental assessment process, as well as authorisations from other administrations and entities such as municipalities, Hydrographic Confederations, bodies competent for the environment, the natural environment or cultural heritage, among others.

- In order to ensure the protection and conservation of the environment, the protection of aspects such as soil, flo, fauna, landscape, habitats, ecosystems and especially the protection of Protected Natural Areas (including Natura 2000 sites) and their adjacent areas is a priority. Therefore, carefulplanning is needed to reduce negative impacts on biodiversity and other environmental factors. In this regard, it should be noted that prioritising a correct location of infrastructure can reduce the associated impacts. Thus, the priority land areas for their establishment should be urban centres, industrial areas, degraded soils and soils of low environmental quality, etc. This would mean reducing the occupation of habitats suitable for fauna and flora, habitats of Community interest (HIC), etc. With regard to the marine area, the Maritime Spatial Management Plans (MPOMS) of the five Spanish marine districts incorporate areas of high potential for biodiversity protection and areas with high potential for the development of offshore wind energy (ZAPER). It should be noted that the MEOP states that areas of high potential cannot beconsidered as areas recommended per se for the implementation of offshore wind projects from an environmental perspective. On the contrary, these areas are recognised as areas with potential, which means that their environmental viability must be assessed and demonstrated during the environmental assessment process applied to each project individually. In addition, management plans for Natura 2000 sites should be taken into account in both terrestrial and marine areas, taking into account the inventory of natural values, the identification of pressures and the objectives and measures of those sites. Similarly, account must be taken of the areas protected by national instruments, the Important Areas for the Conservation of Birds and Biodiversity in Spain (IBA) and the areas of importance and criticism linked to the plans for the conservation and restoration of protected species.

- Synergistic effects and cumulative impacts in relation to the impact on different types shall be considered and assessedas a result of the accumulation of infrastructure, such that an overall assessment can be made. In this respect, in order to meet the criterion of no net loss of biodiversity, appropriate preventive and corrective measures as well as compensatory measures shall be applied in case residual impacts have to be mitigated.

- Following the environmental impact assessment processes, the resulting reports incorporate a number of constraints and measures for the implementation of the project, highlighting the preventive and corrective measures that have to be implementedduring construction and during operation, as well as compensatory measures to compensate for residual impacts that could not be eliminated. Special attention is paid in

the latter to the recreation of steppe bird habitats, for which a minimum of hectares have to be used for agri-environmental measures. In addition to the measures, there is an environmental monitoring plan during the construction and operation of any wind farm or photovoltaic farm, undertaken by a third company, with the aim of ensuring that the measures are put in place and that the measures are operated, and that the maintenance of biodiversity values after the installation of the installations is properly monitored. Otherwise, the necessary remedial actions are alwaysestablished with the aim of preserving and conserving the environment. In this regard, it is essential to have mapping tools that dynamically incorporate the information that is being updated on the basis of biodiversity monitoring, so that environmental sensitivity maps are updated on the basis of this information.

MEASURE 6.9 STRATEGIC ENVIRONMENTAL ASSESSMENT

a) Description

The process of updating the 2023-2030 NECP focuses on strengthening Spain's response to the growingchallenges of climate change and energy transition. In addition to integrating new European requirements, such as reducing emissions, adopting clean energy and improving energy efficiency, priority is given to strengthening the country's strategic autonomy, accelerated by the global energy context.

The update of the National Energy and Climate Plan (NECP) 2023-2030 was subject to a Strategic Environmental Assessment provided for in Law 21/2013 of 9 December on environmental assessment, which culminated in the Resolution of 9 September of the Directorate-General for Quality and Environmental Assessment setting out theStrategic Biental Declaration (SEA) of the 'Update of the integrated national energy and climate plan 2023-2030'.

The EAD reinforces the NECP's commitment to the territory, which is reflected in two specific measures (I am1.1 and measure 1.2) as well as through a broad proposal reflected in the ESEA. It also reinforces the focus on self-consumption. Finally, **it decides that the update of the 2023-2030 NECP**, incorporating the environmental measures and recommendations set out in the Strategic Environmental Study (SEA), together with the environmental determinations incorporated therein, will not have any significant impact on the **environment**.

The main objective of this measure is, without prejudice to the application of the ESAE and the EAD, to specify genetic aspectsfor the correct environmental integration of the implementation of the measures necessary to achieve the objectives of the NECP, paying particular attention to the environmental determinations indicated in the EAD.

b) Objectives addressed

- Ensure that the implementation of the NECP and the actions necessary to meet the objectives continue to be carried out with all environmental guarantees and in a manner compatible with the territory. In particular, the objective of this measure is to ensure that the implementation and implementation of the NECP actions comply with the environmental integration measures of the EsAE and the DAES of the NECP 2021-2030 and the update of the 2023-2030 NECP.
- Promote, through environmental assessment procedures, the minimum environmental impact of the development of projects resulting from the development of the objectives of the NECP by complying with environmental considerations, criteria and recommendations.
- Strengthen the monitoring system for the indicators of the NECP Environmental Monitoring Programme (NECP).
- Promote considerations of the environmental assessment procedure on proper decommissioning of facilities and end-of-life waste management.

(b) Mechanisms for action

- Compliance with the environmental integration measures and the recommendations of the ESAE and the DAES of the 2021-2030 NECP and the update of the 2023-2030 NECP will be implemented and ensured, which will also apply to projects resulting from the implementation of the NECP. This is without prejudice to the identification, in the environmental impact assessment procedures of projects, of the specific conditions under which each project is to be carried out, in order to ensure environmental protection.
- It shall be ensured that the deployment of renewable energy complies with the environmental constraints of the environmental impact

statements or equivalent figures, minimising significant environmental impacts.

- In line with this Plan's commitment to self-consumption, this figure will be promoted against the deployment of renewables on the territory.
- In the area of renewable gases, work will be done to establish measures to minimise gas leakage and indirect emissions in biomethane, biogas and green hydrogen projects.
- Efforts will be made to develop mechanisms to ensure that, at the end of the lifetime of the facilities, developers carry out their proper dismantling, as well as the appropriate restoration of the environment and management of the waste produced.
- In line with Measure 1.1, work will be encouraged to define environmental guidelines and criteria for energy planning.
- Tools will be put in place to improve access to information and to improve environmental monitoring, taking into account information from developers and other actors. In particular, efforts will be made to have the necessary tools to collect information on the evolution of the deployment of renewable energy generation projects and storage systems, so that the environmental impacts of the NECP can be monitored as set out in the Environmental Monitoring Programme (PVA).
- Work will be done to standardise biodiversity monitoring methodologies in farm plants, to improve the quality of projects' environmental monitoring plans.
- As a result of this process, the monitoring system is strengthened with new indicators included in the ESAE of the 2023 NECP, which are based on the Environmental Monitoring Programme of the previous NECP 2021-2030, as well as with new indicators incorporated in the DAES, so as to ensure that the effects of the development of the NECP measures are adequately monitored.
- The proper implementation of all these measures will require the cooperation of all the administrations, including the Autonomous Communities and local authorities, and the other actors involved.

(D) Responsible

General State Administration, Autonomous Communities, local authorities and project promoters.

Article 26 of Law 21/2013 on publicising the approval of the Plan

In accordance with Article 26 of Law 21/2013 on environmental assessment:

a) The Royal Decree approving the update of the 2023 Integrated National Energy and Climate Plan (NECP)is published in the BOE, making the full content of the Plan publicly available on the Minis terio deTransition Ecological website.

b) In**order to ensure the correct integration of environmental aspects**, three measures specifically dedicated to environmental aspects have been created in this Plan, namely Measure 1.1 Development of renewable energies compatible with biodiversity and the protection of ecosystems, Measure 1.2 Development of renewable energies compatible with rural developmentand rural development and Measure 6.9 Strategic environmental assessment. This section 3.6.5 Environmental Assessment has also been created, summarising this procedure and addressing the integration of the main environmental aspects in relation to the NECP update process.

c) The results of **the Strategic Environmental Study (SEA), the Strategic Environmental Declaration (EAD) and the results of public information and consultation have** been incorporated into the NECP and summarised in this section 3.6.5. This section states that 'with regard to the environmental aspects relating to the implementation of the NECP, account shall be taken of everything included in both its ESAE and the provisions of the EAD (both of the 20212030 NECP and of the update of the 2023-2030 NECP)' and creates 'Measure 6.9 Strategic Environmental Assessment' containing the environmental determinations indicated in the EAD of the PNIEC 2023-2030. As regards the results of the public-reporting and consultations, the ESEA included considerations indicated in some submissions made at the stage.

In short, as a result of the environmental assessment procedure, in particular the ESAE and the EAD, and the public participation processes, the measures for the compatibility of renewables with the territory are strengthened and a specific approach is createdas a result of the environmental

assessment process.

Among the main aspects included are:

Among the main aspects included are:

- Improvements in zoning are committed, in order to complement it with the best available information.
- Work will be done to define environmental guidelines and criteria for energy planning.
- Information collection tools relevant for environmental monitoring will be strengthened.
- Greater focus on R & D & I aspects to minimise the impact.
- Commitment to work on the generation of information needed to monitor theenvironmental effects of installations.

d) **The choice of the alternative selected in the ESAE (Chapter 6) of the update of the 2023-2030 NECP, inconjunction with the alternatives considered**, is the result of a multi-stage analysis (considering economic development criteria; environmental sustainability; social and territorial criteria; and technical complexity and economic cost of the actionsarising from the NECP) to which four proposed alternatives have been submitted:

- **Alternative 0:** not to change the current trend.
- **Alternative 1:** this corresponds to the 2021-2023 NECP submitted to the European Commission in 2020,incorporating no projections based on the new context and latest statistical data, in particular as regards the impact on economic and energy variables resulting from the COVID-19 pandemic.

- **Alternative 2:** the above option incorporates the Energy Route Sheets and Strategies publishedafter the approval of the 2021-2030 NECP, as well as the impact of the Recovery, Transactionand Resilience Plan (PRTR), which makes it possible to achieve more ambitious results in terms of emissions, renewable energy and efficiency, among other things.
- **Alternative 3:** it incorporates additional measures on Option 2, to achieve the European objectives stemming from the Fit for 55 package and the REPowerEU Plan, and in particular those set out in the Energy Efficiency Directive and the Renewable Energy Directive, necessary to achieve the overall greenhouse gas emission reduction target, as well as the other energy and climate targets set at European level.

The strategic environmental study includes an assessment on the basis of the above-mentioned criteria of the proposed alternatives, with the result that Alternative 3 is the most favourable one, and it is also the one that allows Spain to fulfil its commitments within the EU.

e) In order to monitor the effects on the environment of the implementation of the Plan, Chapter 10 of the ESAE of the update of the 2023-2030 NECP sets out the Environmental Monitoring Programme (Environmental Monitoring Programme), which is responsible for monitoring, by means of a series of indicators, the environmental effects of the measures in the NECP by means of a binal report, assessing the effectiveness of the preventive and corrective actions of the SAE and the EAD, and adjusting them if necessary, thereby challenginga framework to ensure that the implementation of the NECP is compatible with environmental sustainability, includingthe necessary control and monitoring measures. The EAD completes the indicators proposed in the ESEA (already updated compared to the previous PVA), incorporating new indicators in its determinations in order to properly monitor the Plan. In addition, Measures 1.1 and 6.9 of the updated NECP set out the commitments to improve monitoringof the deployment of renewable energy projects and their lack of environmental impact, to develop and keep up to date a mapping tool that includes existing renewable installations, and to improve the monitoring system for indicators in the NECP's PVA. Furthermore, if, during the development of thein form of the PVA, the different units responsible for generating information on the components considered in the PVA consider that the information could be supplemented by new indicators, these indicators will be included.

3.6.6 Demographic challenge

MEASURE 6.10 DEMOGRAPHIC CHALLENGE

a) Description

Territorial cohesion, and with it environmental sustainability and human habitability, must be seen as a priority and as an opportunity within a new country model aligned with the International Sustainable Development Agendas – Agenda 2030 of the Sustainable Development Goals, the Paris Agreement on Climate Changeand the New Urban Agenda – which place people at the centre of their action. An analysis of theterrible rial model in Spain, and of a large part of Europe, shows that there are two competing processes, one involving population concentration and activities in an increasingly small number of urban areas and the other involving population decline or stagnation in most of our territory, especially in our rural areas and small municipalities, 50 % of which are at risk of disappearing in the coming decades.

The demographic challenge, territorial cohesion, is a country challenge, requiring an inclusive approach from the state and capacity for government decision-making in implementing measures, focusing institutional action on those areas most affected by territorial inequality: medium-sized cities, small municipalities and rural areas. Experience has shown that focusing investments, services and peoplenot on large urban centres has the effect of abandoning rural areas, which leads to a clear socio-territorial imbalance and could lead to differences in opportunities for each other depending on their place of residence. Hence, the need to revive approaches such as polycentric territorial development, with the aim of promoting the promotion of small and medium-sized cities as well as rural areas. The publicpurse for combating depopulation and demographic challenge is part of the social and territorial cohesion policy of the Spanish Government, which today places its emphasis on the structure of the territory and thus the creation of positive synergies between rural, intermediate and urban areas.

b) Objectives addressed

- Promote a strategy for the promotion and cohesion of territories, ensuring balance and territorial cohesion, as well as the functionality of the various territories of Spain.
- Addressing the demographic challenge as a ‘democratic challenge’, so that citizens’ rights are effectively enforced regardless of their place of residence, with a state vision that can focus on territorial cohesion
- Laying the foundations and mechanisms for multilevel and multi-actor governance needed to promote territorial cohesion in Spain. Promote the definition of integrated territorial strategies in the spirit of collaboration between all levels of public administration and public-private and social participation and cooperation with all actors present in the territory.
- To support the territory from the point of view of functionality and the extension of life possibilities for the population.
- Ensuring equal access to services and opportunities.
- Promoting access to services and opportunities throughout the territory, as well as territorial functionality.
- Reduce socio-territorial vulnerability.
- Improve the relationship and interactions between the urban and rural environment.
- Incorporate new, innovative and transformative ways of triggering opportunities in the territory.
- Fine-tuning multilevel and multi-actor governance mechanisms.

(C) Action mechanisms

- **Plan 130 against the Demographic Challenge. The Government’s**Plan of Measures to the Demographic Challenge has 130 measures, organised into 10 axes of action, specifically defined to address territorial cohesion, but aligned with the national strategic framework. The

Plan is geared towards a broad set of objectives that promote equal opportunities and territorial cohesion across all sectoral policies, including economic diversification of the most disadvantaged areas, boosting innovation; full digital connectivity; strengthening rural and urban links; the valorisation of the territory and its endogenous growth potential; adequate provision of basic services; or the incorporation of the demographic perspective into the decision-making process**.**

Following up on this Plan, work is currently underway on the design and drafting of the 30-minute country strategy, which means putting territorial cohesion, proximity of services and equality as a priority in the policy of the demographic challenge. This concept is summarised in ensuring the provision and existence of allthe vital needs of people regardless of their place of residence within a reasonable and appropriate time of access, which often requires rethinking and innovation in the way these services are provided.

- **Mainstreaming and multi-level governance. Demographic challenge**policy, due to its complexity, requires a cross-cutting approach (all public policies: housing, transport, energy, digital connectivity, culture, services, etc.) and multilevel, involving different administrations

  To this end, a governance model has been built consisting of:

  - Government Delegated Commission for the Demographic Challenge, in which all Ministries participate.
  - Sectoral Conference on the Demographic Challenge, as a forum for dialogue with the Autonomous Communities anddistribution of funds. In the period 2021-2024, a total of EUR 176 million has been allocated to the Autonomous Communities to finance projects within their remit.
  - Forum for Territorial Cohesion, as a space for collaboration and participation with social actors, nativeechoes and representatives of civil society.

-Call **for grants for the financing of innovative projects for territorial transformation and the fight against depopulation.** The Secretariat-General for the Demographic Challenge calls annually for grants for innovative initiatives in the territory, in accordance with Order TED/1358/2021, which established the regulatory bases.

These are subsidies on a competitive basis divided into three forms:

- Mode A: for the financing of institutional projects promoted by local authorities.
- Mode B: for the financing of innovative social projects promoted by non-profit entities.
- Mode C: for the financing of business projects aimed at boosting, diversifying and economic reactito areas with particular demographic difficulties, with a particular focus on projects scatteredby women and young people.

- **Rural campus.** This is a programme of university internships in rural environments, an initiative developed by the Ministry for the Ecological Transition and the Demographic Challenge, in collaboration with the Ministry of Universities and the Conference of Rectors of Spanish Universities (CRUE), which allows students from public universities of any official degree to undertake 3-5 months' paid training placements in rural settings.

- **Network of Territorial Innovation Hubs (CIT).** This network is set up as a set of both virtual and physical, interlinked reference spaces for economic and social development and facilitating the promotion of entrepreneurship initiatives, as well as the design and implementation of rural projects, through collaboration between administrations, businesses and entrepreneurs. This territorial transformation highlights technical support for local government and the development of territorial engineering, studies, the creation of social environments, training, dissemination of knowledge to facilitate economic activity, and other actions.

  The Network has added to 2023 Territorial Innovation Centres in Pyrenees, León, Cuenca, Teruel, Soria, Jaén, Cá- ceres and Badajoz; in addition to the agreement with the CIUDEN Foundation for the creation of the core node of the network in Cubillos del Sil (Ponferrada). Efforts are currently being made to extend this network to other territories, making it replicable, and to establish common guidelines for action and to strengthen its networking.

- **The Integrated Municipal Data System (SIDAMUN) project. A data visualisation**tool that makes available to technicians, researchers,

policy makers and the general public a collection of indicators and data from different themes at municipal level, with the aim of facilitating access to as detailed information as possible on the state of play of certain aspects of the territory.

This tool provides information on a total of 8.131 municipalities that make up the Spanishrural area. SIDAMUN allows users to interact in two different ways, either through access to municipal information and its provincial, autonomous and national viewing through different thematic blocks (physical environment, demography, economy, services, housing, environment); or through personalised consultations-using an analysis tool that allows the user to know, using filters, which municipalities in Spain meet a number of conditions.

(D) Responsible

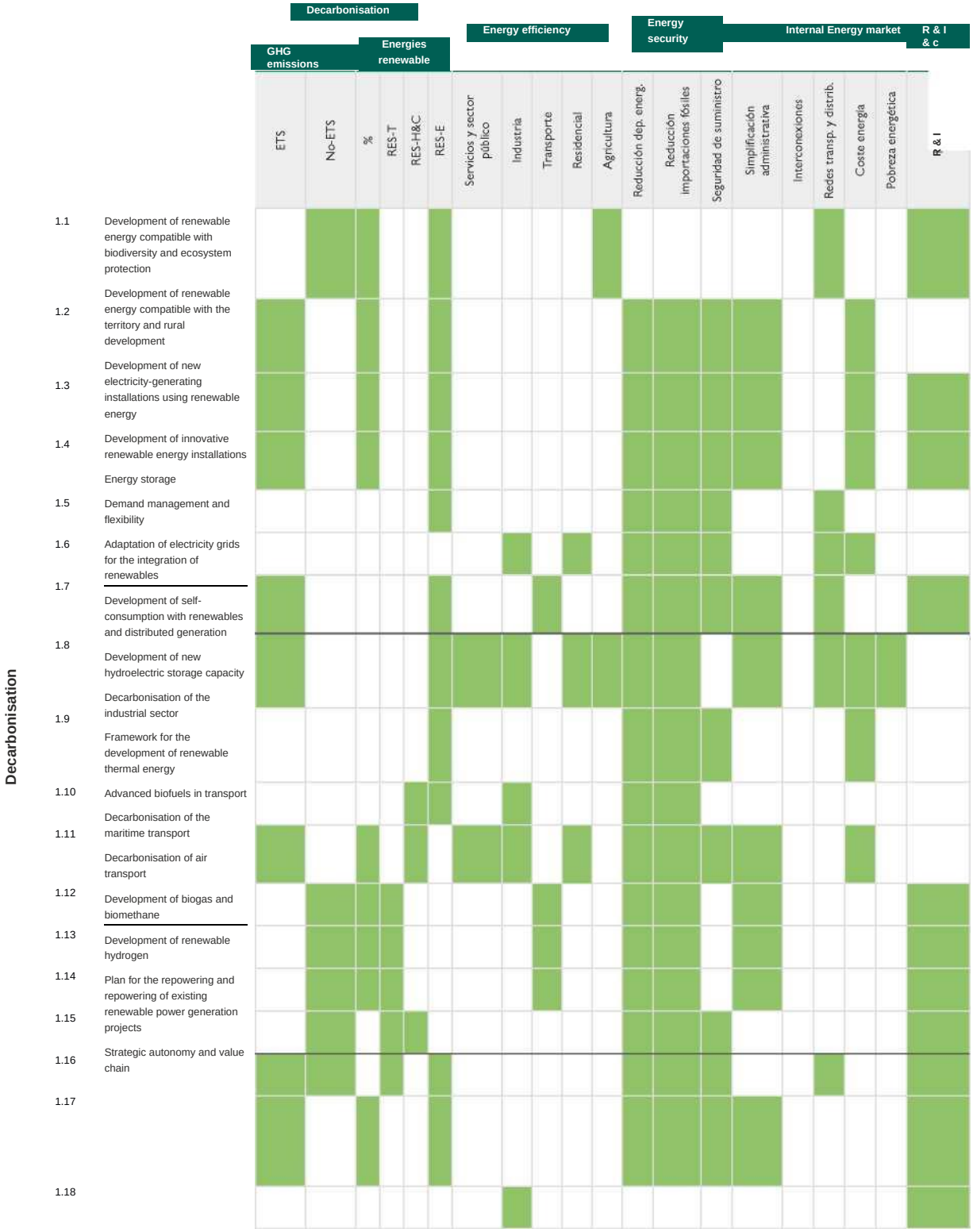
General State Administration, Autonomous Communities and local authorities

3.6.7 Interlinkages between policies and measures

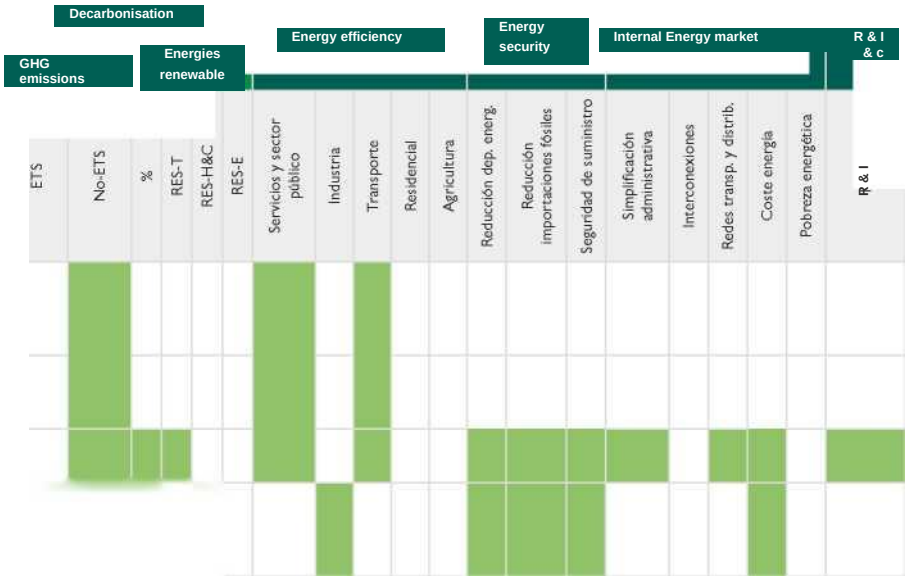
Throughout this section, the different policies and measures have been presented according to the categoryof apli cación in the dimensions considered in the Regulation on the Governance of the Energy Union and Climate Action. However, there are synergies between all the measures set out in this Plan, as the dimensions of decarbonisation, energy efficiency, security of supply, internal market and in stigation,innovation and competitiveness are interlinked.

The matrix of interlinkages between policies and measures presented in this section shows that the investment-innovation, innovation and competitiveness dimension is cross-cutting to the other dimensions, as any improvement in these aspects will contribute to the achievement of the objectives set.

Table 3.6. Matrix of interlinkages between policies and measures




Decarbonisation
GHG emissions
Energies renewable
Energy efficiency
Energy security
Internal Energy market
R & I & c
ETS
No-ETS
%
RES-T
RES-H&C
RES-E
Servicios y sector público
Industria
Transporte
Residencial
Agricultura
Reducción dep. energ.
Reducción importaciones fósiles
Seguridad de suministro
Simplificación administrativa
Interconexiones
Redes transp. y distrib.
Coste energía
Pobreza energética
1.19 New business models for the energy transition
1.20 Promotion of bilateral procurement and promotion of renewable electricity forward markets
Specific programmes for biomass harvesting
1.21 Unique projects and strategy for sustainable energy on islands
1.22 Energy Communities
Citizenship in the Centre
1.23 Fair transition strategy
1.24 Public procurement of renewable energy
1.25 Training of professionals in the renewable energy sector
1.26 Review and simplification of administrative procedures
1.27 Knowledge generation, dissemination and awareness raising
1.28 European Emissions Trading System
1.29 Life cycle assessment of buildings
GHG emission reduction in the agriculture and livestock sectors
1.30
Reduction of GHG emissions in waste management
1.31
Reduction of GHG emissions related to F-gases
1.32 Forest sinks
Agricultural sinks
1.33 Taxation
1.34
1.35
1.36
1.37
2.1
Low-emission zones and sustainable urban mobility
2.2 Modal shift in freight transport with a higher presence of rail



Energy efficiency

2.3. Renovation of rolling stock of means of transport and efficient management

2.4. Improving the efficiency and sustainability of ports

Promotion of electric vehicles

2.5. Improvements in technology and process management systems for non-energy intensive industries

2.6.

2.7. Improvements in technology and process management systems for energy-intensive industries

2.8. Energy efficiency in existing buildings in the residential sector

2.9. Renewal of residential equipment

2.10. District heating and cooling networks in the residential sector

2.11. Energy efficiency in buildings in the tertiary sector.

2.12 District heating and cooling networks in the tertiary sector

2.13. Energy efficiency in cold generating equipment and large air-conditioning installations in the tertiary sector and public infrastructure

2.14. Energy efficiency in farms, irrigation communities and agricultural machinery

Energy efficiency in the fisheries sector

2.15. Promotion of energy performance contracting

2.16. Public sector: accountability and energy efficient procurement

2.17. Energy audits and energy management systems

Training of professionals in the energy efficiency sector

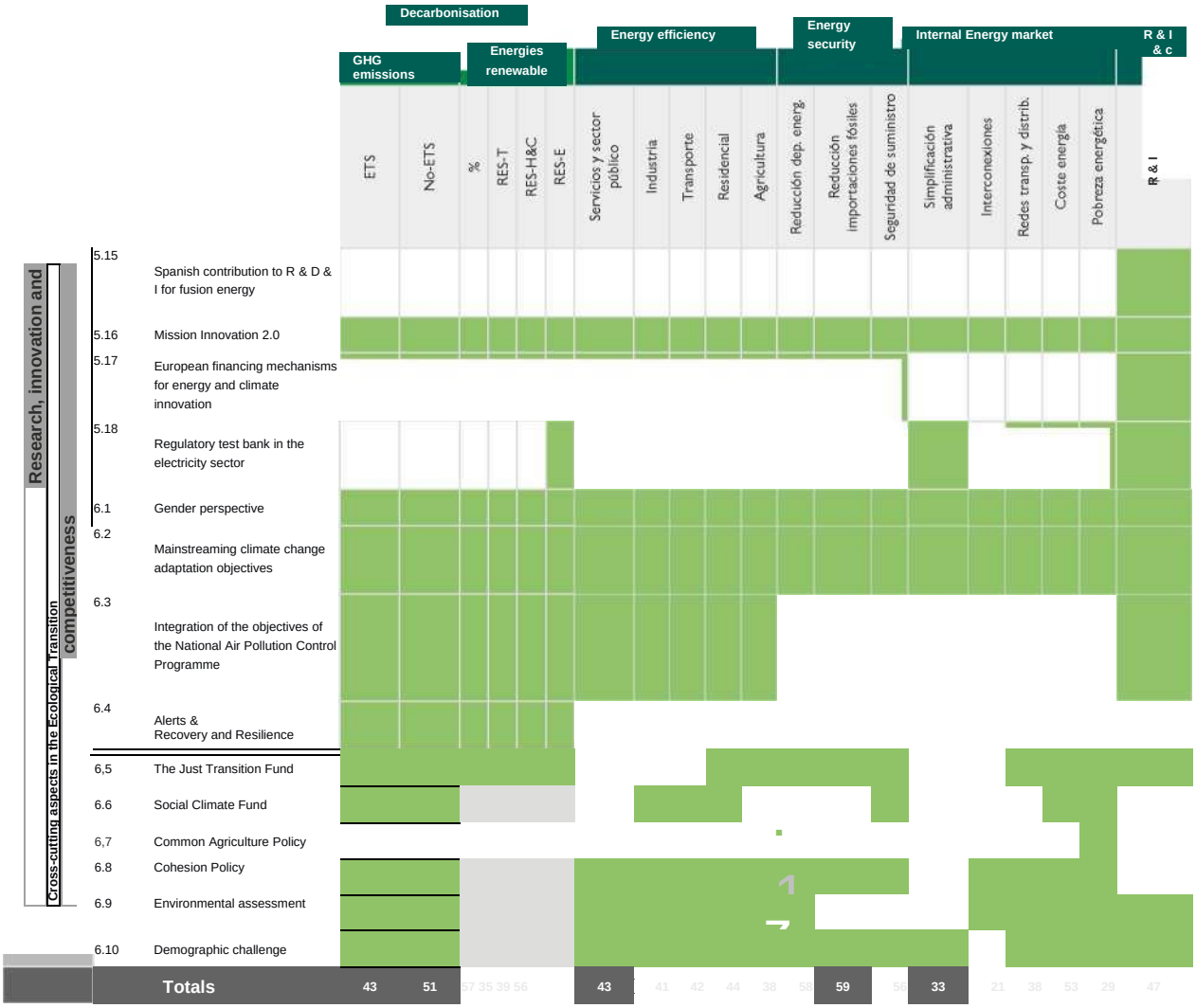
2.18.

2.19.

Y/
0

2.20	Communication and information on energy efficiency
2.21	Other measures to promote energy efficiency: the transition in high-efficiency cogeneration
	Financial measures: National Efficiency Fund Energetic
2.23	Certificate system for Energy Savings
	Plan + Energy Security
3.1	Maintenance of minimum safety stocks of petroleum
3.2	products and gas
	Reducing dependence on oil and coal on islands
3.3	Recharging points for alternative fuels
	Boosting regional cooperation
3.4	Deepening contingency plans
3.5.	Planning for the safe operation of a decarbonised energy system
3.6.	Strategic raw materials for the energy transition
3.7.	Cybersecurity in the Energy Sector
	New electricity market design
	Fight against energy poverty
	Capacity Markets
3.9	Increase of electricity interconnection in the internal market.
4.1	Electricity Transmission Network Development Plan 2021-2026
4.2	Electricity market integration
4.3	Protection of electricity consumers and increased competition
4.4	
4.5	
4.6	
4.7	


Decarbonisation
GHG emissions
Energies renewable
Energy efficiency
Energy security
Internal Energy market
R & I & c
ETS
No-ETS
%
RES-T
RES-H&C
RES-E
Servicios y sector público
Industria
Transporte
Residencial
Agricultura
Reducción dep. energ.
Reducción importaciones fósiles
Seguridad de suministro
Simplificación administrativa
Interconexiones
Redes transp. y distrib.
Coste energía
Pobreza energética
R & I
Internal market
Research, innovation and competitiveness
Access to data
Gas market integration
Protection of gas consumers
Improving the competitiveness of the gas retail sector
Iberian Corridor of Hydrogen. H2MED
4.8 Local electricity markets
4.9 Strategic action on climate, energy and mobility
4.10 Implementation of the SET-Plan
4.11 Supplementary plans in the energy and climate sectors
Scientific and technical infrastructures in the energy and climate sectors
4.12
Public Purchase of Innovative Technology (CPTI) and Pre-Commercial Technology (PPP)
4.13
5.1 Strengthening public venture capital for technology transfer in energy and climate
5.2 Regulatory amendments to facilitate research and innovation
5.3 Promoting public-private partnerships
5.4 Renewable energy co-owned research centres
5.5. Relaunch of the City of Energy Foundation, CIUDEN
Improving SECTI governance and coordination
5.6.
Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition
5.7. ALINNE Technology Platforms and Alliance
Enhancing the internationalisation of SECTI actors in the field of energy and climate
5.8.
5.9.
5.10.
5.11.
5.12.
5.13.
5.14.


Decarbonisation
GHG emissions
Energies renewable
Energy efficiency
Energy security
Internal Energy market
R & I & c
ETS
No-ETS
%
RES-T
RES-H&C
RES-E
Servicios y sector público
Industria
Transporte
Residencial
Agricultura
Reducción dep. energ.
Reducción importaciones fósiles
Seguridad de suministro
Simplificación administrativa
Interconexiones
Redes transp. y distrib.
Coste energía
Pobreza energética
R & I
Research, innovation and competitiveness
Cross-cutting aspects in the Ecological Transition
5.15 Spanish contribution to R & D & I for fusion energy
5.16 Mission Innovation 2.0
5.17 European financing mechanisms for energy and climate innovation
5.18 Regulatory test bank in the electricity sector
6.1 Gender perspective
6.2 Mainstreaming climate change adaptation objectives
6.3 Integration of the objectives of the National Air Pollution Control Programme
6.4 Alerts & Recovery and Resilience
6,5 The Just Transition Fund
6.6 Social Climate Fund
6,7 Common Agriculture Policy
6.8 Cohesion Policy
6.9 Environmental assessment
6.10 Demographic challenge
Totals
43 51 47 35 39 56 43 41 42 44 38 58 59 56 33 21 38 53 29 47

SENSITIVITY

IMPACT OF POLICIES AND MEASURES

4. ANALYSIS OF THE IMPACT OF POLICIES AND MEASURES

4.1. Introduction

According to recent studies by major international organisations (OECD 2017, IRENA 2018, IEA 2023)energy transaction will generate increases in welfare levels, economic activity and employment, as well as multiple co-benefits in public health (Markandya et al 2018). The benefits will be particularly importantin countries that are more dependent on fossil fuels and have a high availability of renewable resources.

The OECD in its *Investing in Climate study, Investing in Growth* notes that meeting the Paris Agreement will immediately generate positive impacts and increase GDP by 2.8 % by 2050 on average in the G20 countries. Other studies such as IRENA*'s Global Energy Transformation* agree with the OECD on these positive impacts and notes that within the G20 countries the most beneficial ones will be those located in southern Europe.

Finally, and more recently, the International Energy Agency foresees in its *Technology Energy PerspectiReport 2023* that if the countries' announced energy and climate commitments are met, net jobs associated with new "clean" industries would rise from the current 6 billion to 14 billion globally in 2030. The IEA notes that the transition will also have some risks, including risks related to access to critical materials.

This chapter analyses the socio-economic and public health impact150 of the NECP151. Firstly, the methodology used and the estimation of the investments needed to achieve the objectives are presented. Subsequently, themain macroeconomic impacts (GDP and employment) and the impact on public sector and household accounts are set. Finally, a sensitivity analysis, the limitations of the methodology used and final conclusions are presented.

4.2. Methodology

4.2.1. Estimation of economic impact

The economic impact of the NECP has been estimated using the DENIO model152 (Kratena et al. 2013, arto et al. (2021). DENIO is a Neokeynesian Econometric Dynamic Model Input-Output of the Spanish economy, including 74 sectors, 88 products, 16 consumption categories, 22.000 household types and public sector accounts. DENIO is a model designed to assess the economic impact of scenarios and policies in Spain, especially those related to energy and climate change. The model analyses the impact of these policies on a number of socio-economic variables such as employment, gross domestic product (GDP), trade balance, household income/expenditure/wealth and its distribution, savings, government accounts, private and public debt, inflation, etc.

150 In relation to human health, mention should be made of the Strategic Plan for Health and the Environment (PESMA) 2022-2025, which sets out the actions to be taken to reduce the health impact of the main environmental factors and their determinants. Aligned with adaptation policies, its strategic objectives include developing the most effective measures to prevent and control the effects of climate change on human health.

151 This chapter is an updated version of the impacts of the previous version of the NECP (2019)

152 See a summary here: httpsendeavour//www.funcas.es/wp-content/uploads/2020/12/Arto-et-al.pdf

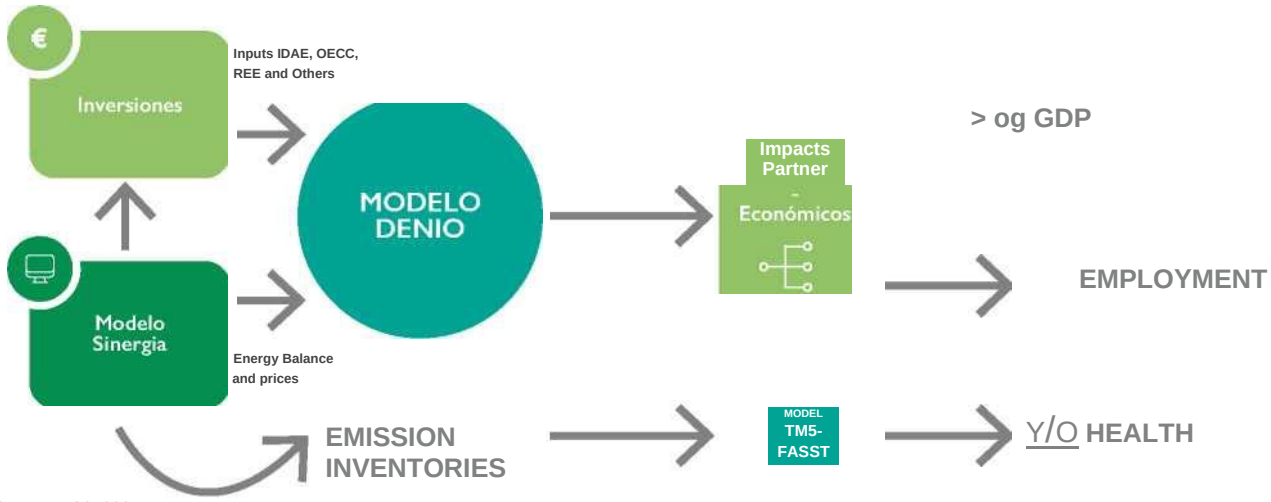
4.2.2. Estimation of health impact

The co-benefits for health have been estimated using the TM5-FASST model. TM5-FASST (Van DINGE nenet al. (2018) it is a future-recipient air quality model that allows the health effects of different emission paths to be analysed. The model analyses how emissions from a given source affect different geographical areas in terms of concentration, exposure and, consequently, premature deaths. The damage functions used are calibrated with WHO/IHME data (Burnett et al. 2014, Markandya et al 2018). A more detailed descriptionof both models can be found in the annexes. The analysis analyses only the impacts on air quality resulting from the mitigation of air pollutant emissions, including greenhouse gases, but does not include other impacts, such as those related to energy poverty. The study does not address climate changepacts on health, although it includes a reference to other health policy documents.

4.2.3. Process schema

Figure 4.1 gives an outline of the process followed. On the one hand, and in the economic part, the energy balancesand energy prices obtained from the TIMES-SI NERGIA model have been introduced as input information or 'input' in DENIO and(b) the investments estimated to achieve the objectives. The impact study is carried out on the basis of an economicscene of reference to 2030 drawn up by the Ministry of Economic Affairs and Digital Transformation.

Figure 4.1.Methodology: inputs and outputs of the DENIO and TM5-FASST models



Source: BC3, 2024

On the other hand, and in the health part, the Spanish Inventory and Projects System of the Ministry for the EcoLogical Transition and the Demographic Challenge (MITECO) has used the data from the energy balance of the TIMES-SINERGIA model to contribute to the emissions of air pollutants in 2030153. The projection of these emissions ofrich air pollutants is the one included in the TM5-FASST model to estimate the health co-benefits.

153 httpsendeavour//www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/proyecciones-emisiones.html

4.3. Investments

This section sets out the estimated total investments for the period 2021-2030 needed to achievethe NECP wavers.

Investments can be divided into the following five broad categories: (I) energy savings and efficiency; (II)electrification of the economy; networks (iv) renewable energy (including green hydrogen) and (v) other measures154.

The basic information for estimating investments comes from several sources. The investments dedicated to increasing energy saving and efficiency come from the Institute for Energy Diversification and Saving (Instituto para la Diversificación y Ahorro de la Energía, IDAE). Theinventions associated with renewable energy (electric and thermal) and electrification come from the MES-SINERGIA TI-model. The basic information on investments in transmission and distribution networks comes from Red Eléctrica in Spain. Finally, information on investment in non-energy diffuse sectors comes from the ClimateChange Office (OECC).

Total investments to155 achieve the objectives of the NECP are estimated to reach EUR 308.000 billion (MEUR) between 2021-2030. These investments (see Figure 4.2) are shared between renewables (37 %), energy savings and efficiency (28 %), grids (17 %) and electrification (17 %) and others (1 %).

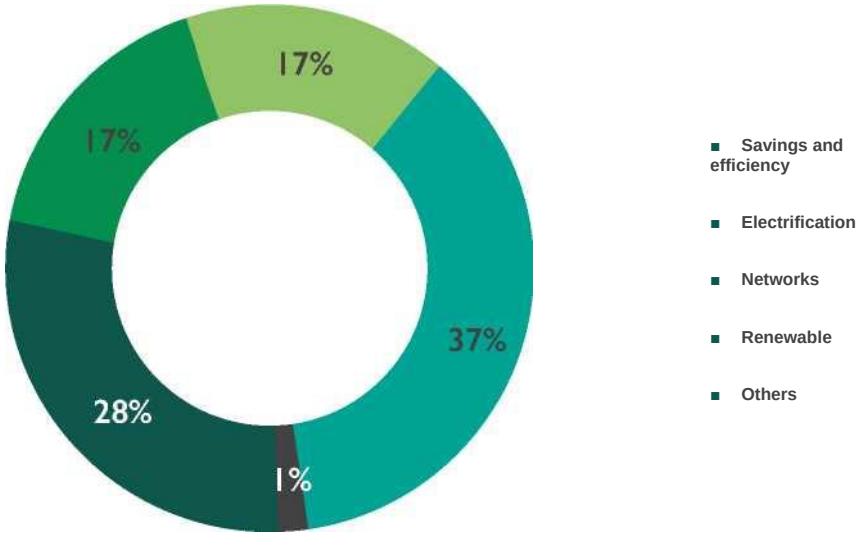
With regard to the source of the investments, a substantial part of the total investment is likely to come from the private sector (82 % of the total) and the rest from the public sector (18 % of the total). It is noteworthy156 that thanks to Next Generation EU funds and the Recovery, Transformation and Resilience Plan (RRP) a significant proportion of public investments are financed by European funds (13 % of the total).

154 This category includes measures and investments associated with non-energy diffuse sectors. They are included separately, even though they are small because of their difficulty in being included in any other category.

The additional investments are**155** estimated to reach EUR 263 billion compared to a baseline scenario.

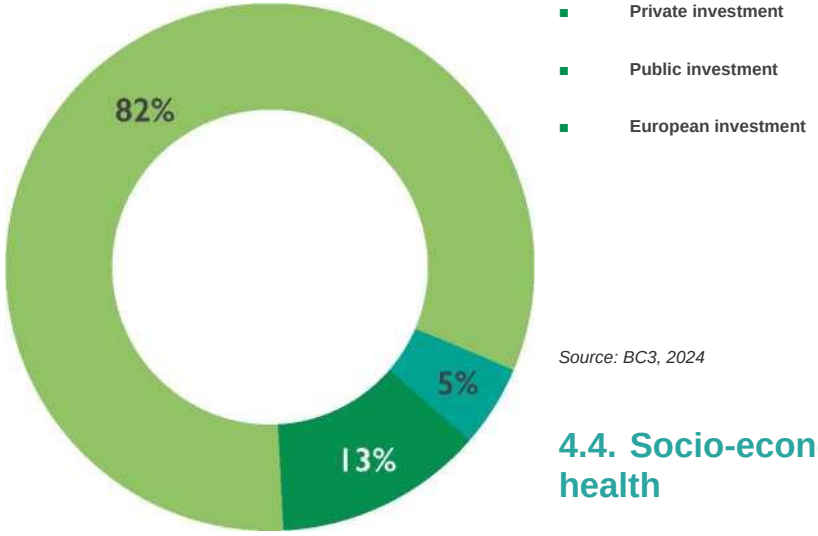
156 This is relevant for economic impacts, as European public investments do not have an impact at the level of public deficit because the modelling has been carried out. By contrast, public investment financed by resources from the Spanish public administration implies areduction in other items to comply with the public deficit path (which is exogenous and fixed).

Figure 4.2.Distribution of total investments by type of measure



Source: MITECO and BC3, 2024

Figure 4.3.Allocation of total investments by source of financing



Source: BC3, 2024

4.4. Socio-economic impacts and health

This section presents the results achieved at socio-economic and health impact levels. Before analysing the results, several considerations need to be made.

Firstly, and following the approach required by the Governance Regulation, the results presented below are a comparison between a trend scenario (without NECP) and the NECP target scenario. The baseline

is based on the projection made in 2019 for the first drafting of the NECP (and is therefore a scenario without investments in the PRTR[157]).

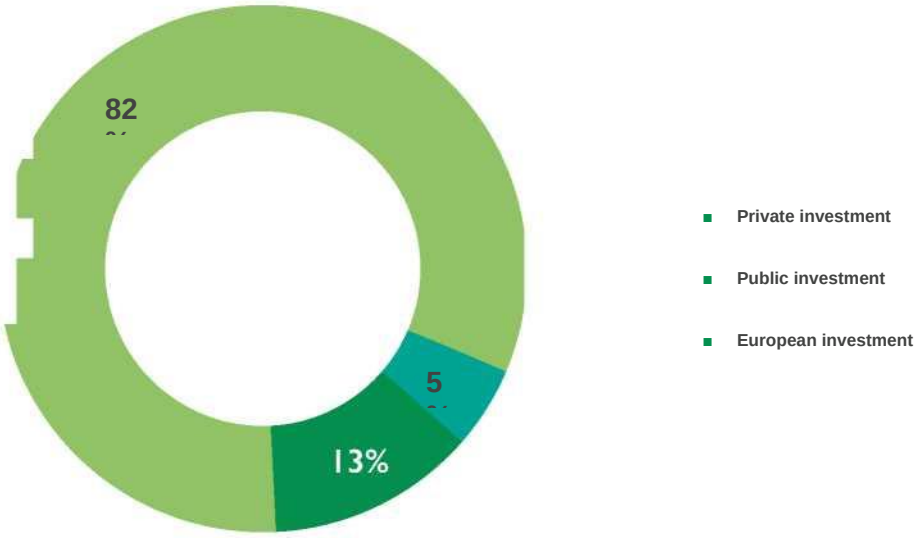
Secondly, it has been considered in the modelling that the general government (public administration) and households have threebudget trictions. For public authorities, the new government deficit targets (2.5 % in 2026) included in the Stability Programme 2023-2026 have been included. In the case of households, it has been considered that their debtcapacity cannot increase compared to the baseline scenario.

Finally, in the case of the private sector, it is considered that there will be no financing constraints for the financing of the NECP and that this will occur at the usual cost of capital. The estimated impacts in this study reflect the impacts of the public and private investments needed to comply with the NECP, as well as the effects related to the change in the *energy mix* achieved.

4.4.1. Impacts on GDP and employment

This section shows the socio-economic impacts of the NECP measures on GDP and employment.Figure 4.4 shows that GDP[158] would increase between 25.700 and 44.000 MEUR/year between 2025 and 2030. This represents an increase of 3.2 % in 2030 compared to the baseline scenario. It is important to note that all the impacts included in thisheading are additional to the baseline scenario.

Figure 4.4.Change in GDP by type of measure (MEUR/year)



Source: BC3, 2024

The results of the figure are determined by two main effects. Firstly, due to the effect of the investments

157 The estimated impact in this chapter corresponds to the NECP, but since the PRTR contributes to its fulfilment, some of these impacts are also included in the economic impact study of the PRTR. Therefore, both impact assessments should not be added together.

158 All data refer to constant 2014 prices.

159, i.e. the sum of the planned public investments and the private investments to be mobilised driven by the policies of the NECP. These investments imply increases in aggregate demand and generate an increase in economic activity during their execution, explaining most of the impacts.

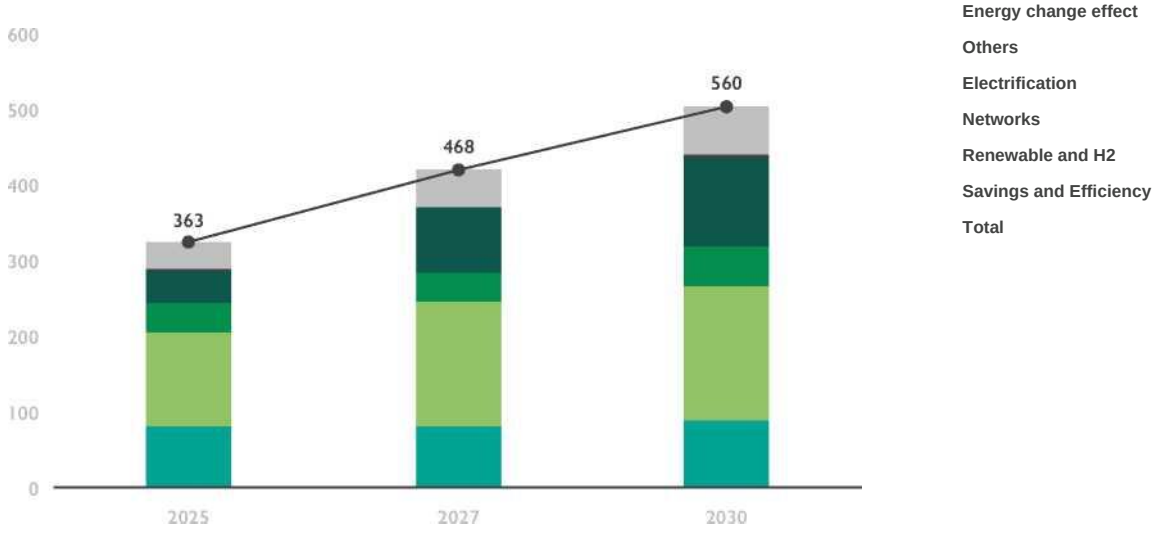
Secondly, by the effect associated with 'energy change'. This effect160 (on the supply side) includes the impact of energy savings that can free up resources and which in turn generate higher spending on other goods and services. TAMalso includes the impact of the change on *the energy mix* that generates higher national added value by replacingfossil combusti (imported) with renewable energy installed in the country. The impact of this effect is initially small, but it grows towards 2030 when investments in savings, efficiency and renewables are taking effect and fossil fuel prices are higher. In fact, the reduction in the consumption of imported fossil fuels represents cumulative savings of EUR 86.750 billion until 2030 for the Spanish economy as a whole. Other policy effects such as those related to competitiveness have not been included in the analysis, as explained below.

The effect of investments is maintained while they are being implemented, while the effect of the geneshift would continue after 2030. In this respect, it should be noted that the effects on GDP (and on employment and other variables) are not cumulative. Each impact figure should therefore be associated with the year in question wheninvestments are channelled.

In terms of employment impacts, Figure 4.5 shows that the total number of persons employed would increase by between 362.000 and 560.000 persons/years in the period 2025 to 2030. This represents an increase in employment of 2.8 % in 2030 compared to the baseline scenario.

As explained above, this employment is an additional job resulting from the comparison between employment in the target scenario and the trend scenario.

Figure 4.5. Impact on employment by type of measures (thousands of people)



Source: BC3, 2024

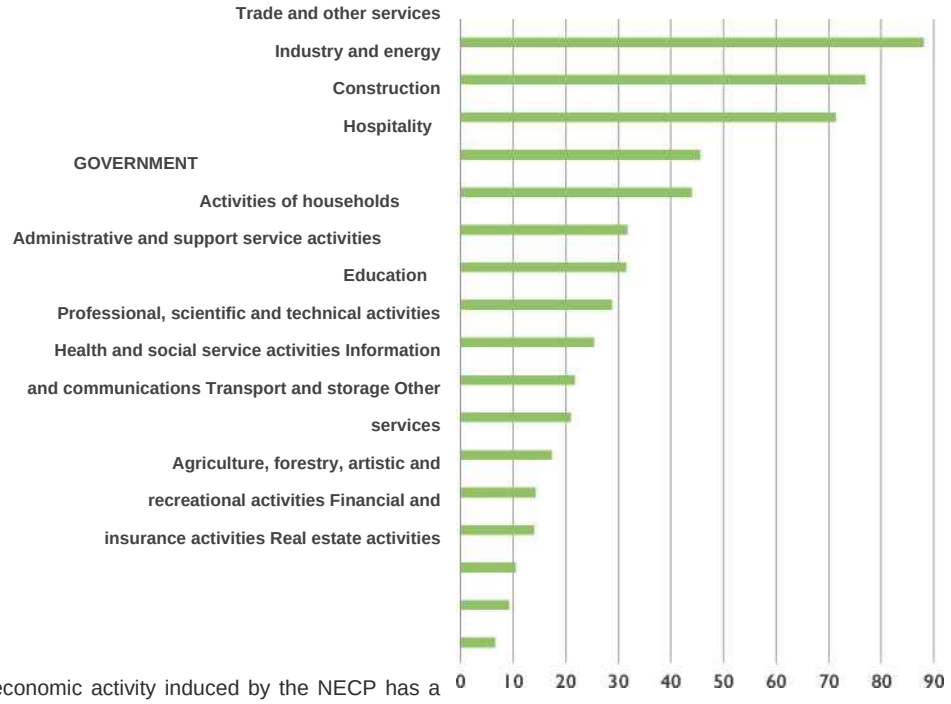
It**159** is important to note that not all investment is transformed into value added and job creation within Spain, since a part (around 20 % and depending on the sectors) needs imported goods, and therefore part of the economic impact occurs outside the country, which the model allows to be captured in detail and is already captured in the results.

The integrated (energy and economic) and multi-sectoral**160** nature of the DENIO model allows this effect to be captured.

As in the case of GDP, the impact on employment is mainly driven by the effect of investments in reversals andsavings and efficiency, to a lesser extent in electrification networks and by the effect of energy change towards 2030. Investments in renewables and green hydrogen would generate between 138.000 and 199.000 jobs/year, while investments in savings and energy efficiency would generate between 87.000 and 121.000 jobs/year. Investments in relocations wouldgenerate between 42.000 and 60.000 jobs/year and electrification between 47.000 and 113.000 jobs/year. Finally, the change in the energy *mix* would indirectly generate up to 72.000 jobs/years in 2030.

Figure 4.6 shows the jobs generated by industries according to the National Classification of Activities orQucas. The industries where the most jobs would be generated are Trade and Repair (87.000 jobs/year in 2030), Industry161 and Energy (77.000 jobs/year in 2030) and Construction (71.000 jobs/year).

Figure 4.6. Impact on employment by area of activity (thousand persons/year)

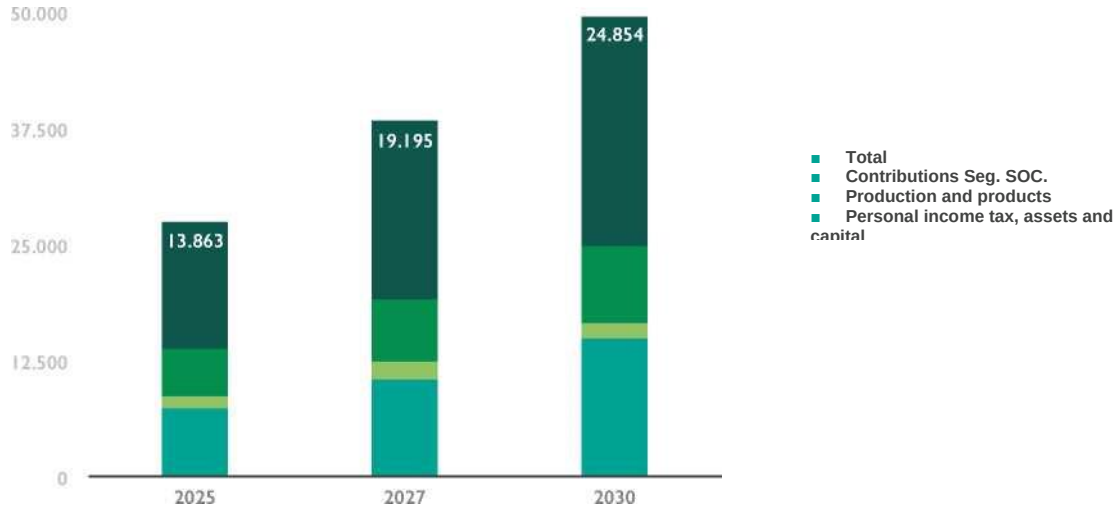


Source: BC3, 2024

The increase in economic activity induced by the NECP has a positive impact at the level of revenue,maintaining the same tax rates. As Figure 4.7 shows, public revenues would increase by between EUR 13.800 billion and EUR 24.800 billion per year between 2025 and 2030, creating new possibilities for the use of such public resources (see Figure 4.8). In this regard, it should be noted that the NECP funding shown in Figure 4.8 includes only Spanish public funding, which accounts for 27 % of all necessary public investment, the rest (73 %) coming from European funds.

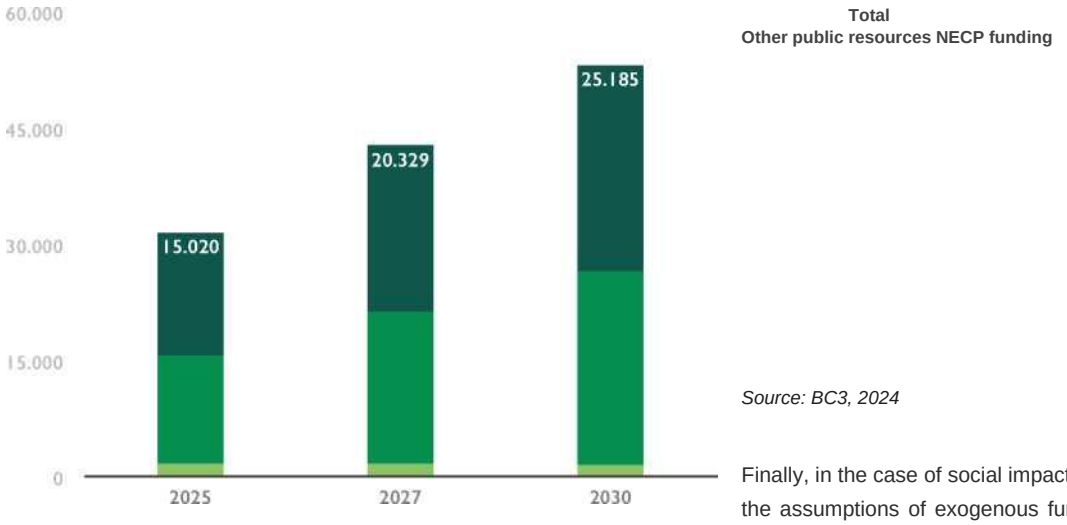
161 Industry (C) includes extractive industry (B), electrical industry (D) and water (E).

Figure 4.7. Impact on public sector accounts: revenue (MEUR)



Source: BC3, 2024

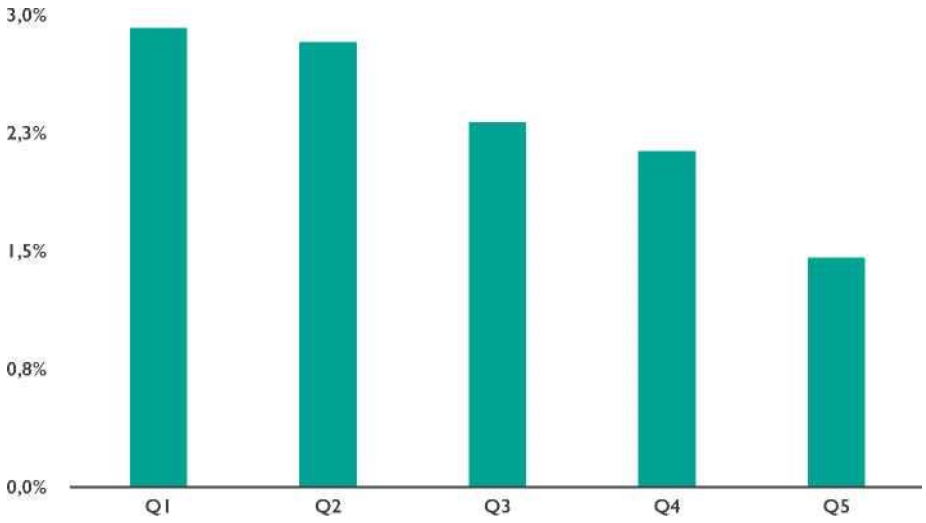
Figure 4.8. Impact on public sector accounts: expenditure (MEUR)



Source: BC3, 2024

Finally, in the case of social impacts, given the assumptions of exogenous funds and constraining the increase in household indebtedness, the results obtained indicate that the economic effects are beneficial for all households, but relatively more for lower-income households. Figure 4.8 shows that disposable income wouldaccrue in all quintiles, but to a greater extent in lower-income quintiles. Quintile 1 and 2 would increase their income by 2.9 % and 2.8 % respectively, compared to an increase of 1.5 % in quintile 5. This effect is mainly explained by the fact that the lowest quintiles capture a larger share of the new wage income generated as a result of the increase in employment.

Figure 4.9. Increase in gross disposable income over households by income quintile (%)



Source: BC3, 2024

Finally, the NECP will help reduce energy bills for businesses and households. According to data from the Family Budget Survey, the percentage of income used to pay energy bills (electricity, fuels, natural gas and other fuels) was on average 7.8 % in 2019. Given the price increase expected by the European Commission for fossil fuels (an increase of 25 % for oil products and 13 % for gas by 2030) the average energy bill would increase to 8 % in a trend scenario in 2030. However, thanks to the energy savings and lower electricity prices achieved with the measures of the NECP, the energy bill will not only increase, but will achieve an average reduction to 5.7 %.

This reduction in bills will be particularly beneficial for those households that spend a larger share of their income on electricity, mostly low-income and middle-income households. It will also favour other groups suchas older per sonas living alone or single-parent families, both of which are mostly women.

4.4.2. Health impacts

This section contains a section with the co-benefits in terms of health resulting from the reduction of air pollution from the PNIEC and another section on the health effects associated with changes in extreme temperatures. The first part is based on an exercise carried out specifically to assess the impact of the NECP, while the second part contains some relevant data from the Strategic Plan for Health and Environment.

Co-benefits associated with the reduction of air pollutants

Policies aimed at reducing greenhouse gas (GHG) emissions often have positive effects on public health as they manage to reduce emissions of air pollutants,often associated with the same sources and production processes that produce EIGs.

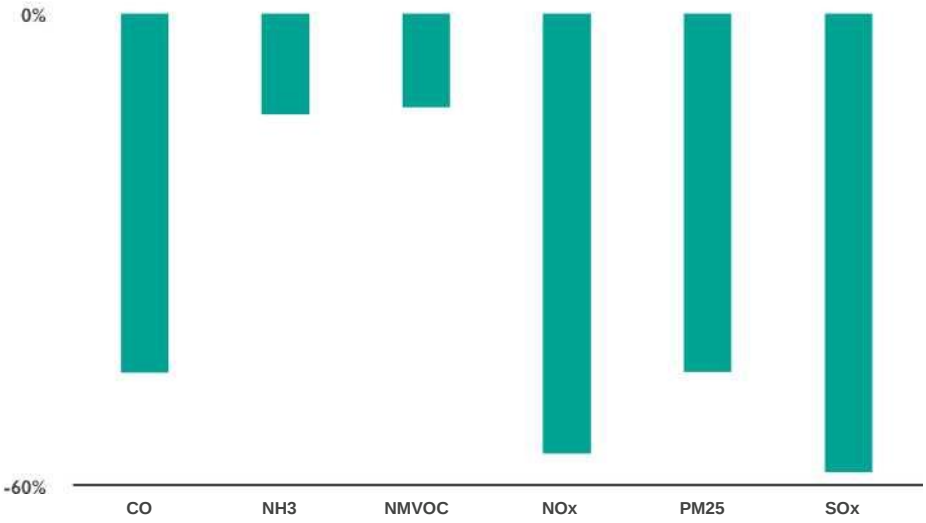
The emission of air pollutants causes significant damage to human health. The biggest health effects are fine particulate matter (PM2,5) and ground-level ozone (O_3). PM2,5 is the main cause of premature deaths attributable to poor air quality162163, causing problems in respiratory (lung cancer), cardiovascular or brain systems (ischaemic attacks). With regard to ground-level ozone (O_3), although usually associated with damage to agricultural systems, it also has significant negative health effects,particularly due to respiratory diseases.

Pollution**162** rates in Spain are higher than those indicated by agencies such as the World Health Organisation (WHO): 5micr/m3.

163 httpseverything//www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/informeevaluacioncalidadairees- pana2022-tcm30-590211.pdf

Air pollution is the result of emissions of gases and particulate matter from human activity (social and economic) and natural sources. Air pollutants with different impacts on the atmosphere, and consequently on quality of life and ecosystems, include sulphur dioxide (SO_2), nitrogen oxides (NO_2 and NO_x), carbon monoxide (CO), ozone (O_3), particulate matter (including metals, compounds,organic and inorganic secondary compounds) and a high number of volatile organic compounds (VOCs). Theclimate also affects the processes of dispersion and transport of pollutants in the atmosphere and is therefore a determining factor for air quality[14].

Figura 4.10. Emisiones de contaminantes atmosféricos en 2030 (% respecto a 2019)

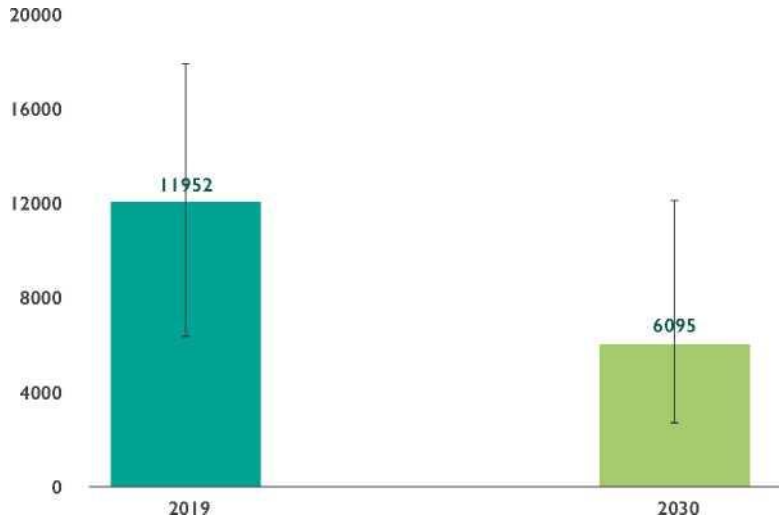


Source: Inventory Unit, MITECO, 2024

Figure 4.10 shows the change in the main air pollutants in the target scenario compared to 2019. As can be seen, emissions of SO_2, NO_x and PM2,5 are reduced by 57 %, 56 % and 45 %, with duerespect. The remaining emissions are also reduced, albeit less, as they require additional measures thatare not so directly associated with EIG mitigation policies.

These reductions lead to a reduction in damage to public health. This reduction in damage has been measured through premature deaths from environmental pollution using the TM5-FASST model in Spain, which allows capturing how emission reductions result in a reduction in concentrations, and thus a reduction in premature deaths due to poor air quality using integrated functions of the exposure type (Burnett et al. (2014).

Figure 4.11. Impact on health (premature deaths)



Source: BC3, 2024

Figure 4.11 shows the premature deaths from air pollution in 2019 and the anticipateddeaths by 2030. In Spain, according to the latest Global Burden of Disease study164, it is estimated that, in 2019, deaths caused by air pollution reached 11.952, of which 9.058 would beassociated with exposure to PM2,5 and 2.894 to exposure to O_3. The series of measures implemented in the NECP means that premature deaths in 2030 are reduced, taking medium values, to 6.095 premature deaths, leading toa reduction of 5.857 premature deaths. These values represent, in 2030, a reduction of 49 % compared to the 2019 values.

Health and Climate change

Climate change is one of the main environmental and public health issues at the inter-nationallevel. For this reason, the Ministry of Health, in coordination with the Ministry for the Ecological Transition and theGraphic Challenge, launched in 2021 the Strategic Health and Environment Plan, which responds to the need to equip Spanish society with a management tool to address major environmental challenges with a '*One Health*' approach. The aim of this plan is, inter alia, to protect people's health from the adverse effects of the cold and theextreme shaft, choosing information and measures along the same lines as the numerous international projects in force in this area, such as the Paris Agreement and the WHO Global Strategy on Health, Environment and Climate Change. In particular, SDG 13 deals specifically with climate change, and its targets are also supported by the Plan, such as promoting adaptation to its consequences, reducing the impact on health and integrating climate change measures into national policies and plans. At the Climate Action Summit, at which the agreement was signed, this topic was and continues to be a priority to keep the temperature rise below 2 °C and adapt to the risks arising from it. With regard to its impact on health, the 13th WHOWork Gene Programme 2019-2023 sets out objectives very closely in line with those set out in the Plan, such as reducing climate-related mortality by 10 %.

According to this Plan, for the whole of Spain, the average value of the increase in mortality per degree centigrade above the threshold temperature is 9.9 %; the impact on respiratory causes (15.3 %) is greater than for latorycircu (9.9 %). Heat-related mortality is not only quantified by what is known as 'heat shock', but is also related to the aggravation of pre-existing pathologies (cardiovascular and respiratory diseases, renal cau, gastrointestinal and even neurological diseases). In addition, rising temperatures have been linked to an increase in the number of premature births, as well as an increase in the number of low-weight births. It should be noted that the effect of thermal extremes is greater on certain more vulnerable groups, especially older people. These effects of high temperatures

The European Environmental Agency's**164** estimates of premature deaths are higher than those estimated by the WHO. This study uses WHO estimates as the TM5-FASST model is calibrated for these results.

are particularly relevant in a context of climate change, where projections indicate a progressive increase in high temperatures.

On the other hand, the impact of extremely low temperatures is also noteworthy, since, despite the observed global warming, climate change will not cause cold waves or their health effects todissipate. The number of cold waves in Spain is higher than the number of heatwaves. The effects of heat waves occur in the shorter term (3-4 days) than the effects of cold, for which mortality and hospital admissions usually occur between 7 and 14 days after the fall in temperatures. At the level of the whole of Spain, for each degree where the minimum daily temperature is below the threshold for defining cold wave, daily mortality increases by 11.5 %; the effect on respiratory causes (19.4 %) is higher than circulatory causes (15.3 %). Every day with a cold wave, the average mortality in each provincial capital is increased by 3,5 deaths per day (a value of more than 3.0 in the days of heat wave).

4.5. Sensitivity analyses

This section contains a sensitivity analysis165 on macroeconomic performance. Pende impact analysis ofmultiple variables with different degrees of uncertainty. Although many uti elements and parametersare listed in modelling, factors associated with energy prices have been chosen for this sensitivity analysis, as these are one of the most uncertain factors, as demonstrated by the recent energy crisis. To this end, the effect of an alternative pathway on fossil fuel prices has been analysed.

The prices used in the impact analysis, and the results of which are shown in the previous sections,come from the European Commission. These prices have to be used by all Member States in the preparation of their respective NECPs.

In this sensitivity analysis, we compare the central price scenario of the European Commission, with two otheralternative scenarios with a ± 25 % change in the prices of fossil fuels (coal, oil and its derivatives, and natural gas). This sensitivity analysis makes it possible to assess a wider range of future situations.

Figure 4.12 shows the results of the impact of the NECP on GDP in the different fossil fuel price scenarios. Lower fossil fuel prices also have a lower impact in terms of GDP and employment compared to a counterfactual scenario, and vice versa. A 25 % reduction in prices leads to a 8 % reduction in the impact on GDP, while an increase of 25 % is an increase of 5.7 %. This is because the change in the price of fossil fuels ultimately affects the reduction in energy bills resulting from saving and efficiency measures. Thus, in an environment of high energy prices, the Ahorro on the energy bill resulting from the actions of the NECP will be higher, which will allow greater growth in consumption, which in turn will lead to an increase in investments not linked to the Plan and also in tax collection and public consumption. The opposite would occur in a lower price situation.

The sensitivity analysis**165** was carried out only on the DENIO economic model, but not on the TIMES-SINERGIA model.

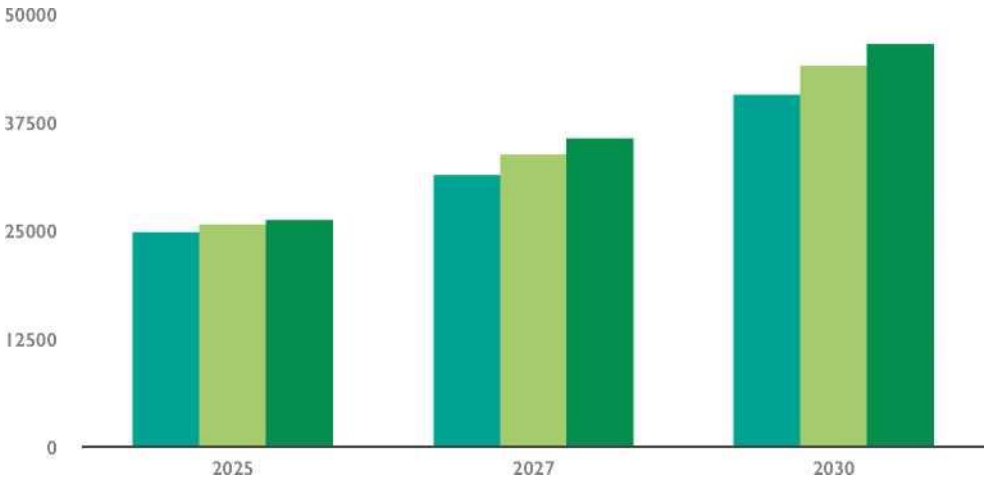
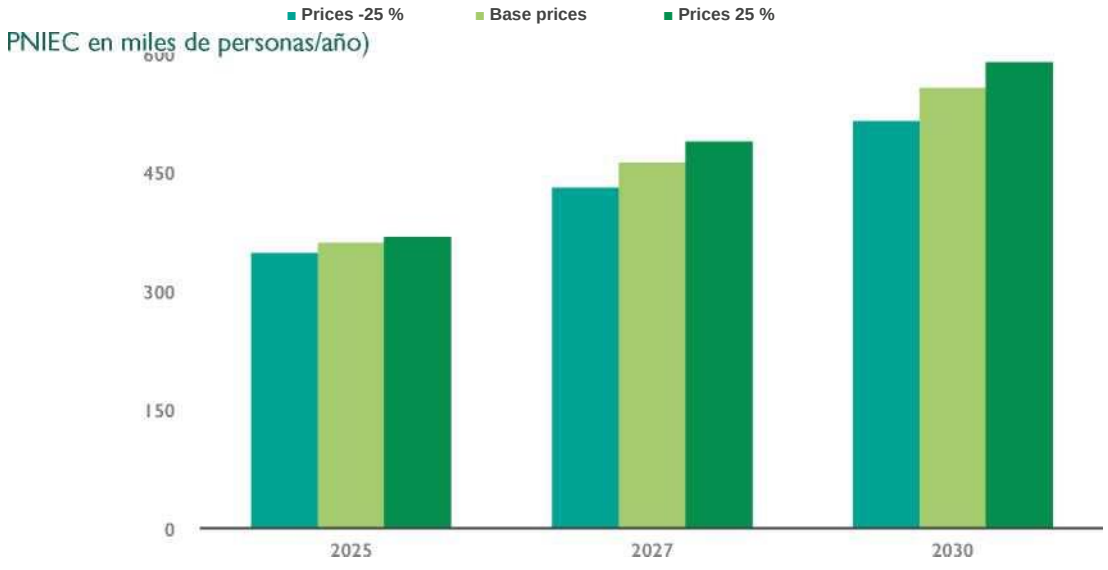


Figure 4.12. Fossil fuel price sensitivity analysis: GDP (deviations from path without NECP in MEUR/year)

Source: BC3, 2024

Figure 4.13 shows the results in terms of employment. The jobs created would rise from 560.000 persons/year in the central scenario in 2030 to a range of between 518.000 and 592.000 persons/year. A 8 % price reduction creates a 25 % reduction in jobs created, while a 5.6 % increase means a 25 % increase in jobs. The reasons for this higher/lower increase are the same as those stated for GDP.

Figure 4.13. Fossil fuel price sensitivity analysis: employment (deviations from path without



Source: BC3, 2024

4.6. Limitations

This section sets out the main assumptions and limitations of the results obtained in terms ofnomic socio-eco and health impacts.

First, additional investment largely drives the results, stimulating employment and economicactivity by boosting aggregate demand. In this case, the additional investments between the target scenario and the baseline scenario have been estimated to amount to EUR 263.000 billion, or 85 % of total investments. These Inversiones have been incorporated in the estimates in an exogenous manner and therefore do not incorporate possible *crowding-out* effects. An increase/reduction of these additional investments will result in an increase/decrease of the impacts shown. Moreover, the investments have a component of uncertainty inherent in any forecast for 2030 and whichare affected, inter alia, by factors such as the expected cost reduction in the different technologies and the absorption capacity of the Spanish economy. Secondly, it is important to bear in mind that no competitiveeffects have been considered. In this regard, the price differential between domestic production and imports has been assumed to remain constant, as it is assumed that the other countries in the environment will implement similar policies. On the other hand, it should be noted that the activity and jobs generated will depend on the capacity of each sector to seize opportunities in global value chains. In this respect, the lower relative cost of renewable energy planned for Spain is most likely to lead to improvements in competitiveness, especiallyfor energy-intensive industries (IEA 2023), thanks to lower electricity and energy prices relative to the environment. However, these phenomena are more difficult to quantify. A neutral approach to competitiveness has therefore been chosen, which is likely to underestimate the impacts associated with the policies and reforms of the NECP. Thirdly, the investment matrices by goods and sectors that have the (limited) level of disaggregation allowed by the INE (*top-down*approach) have been used to study the impacts. An alternative approach could have been to characterise the structure of the investment orthe chaos of value at a higher level of disaggregation, i.e. for each type of technology (*bottom-up*approach). Although this approach would be desirable, it is not easy for all technologies and measures. Finally, the estimates of modeTM5-FASST have some technical limitations on their application for Spain. First, the model uses cells of 0.75x0.75 degrees. In addition, the model provides data at regional level, taking the Iberian Peninsula as a single region. To disaggregate the results for each country (Spain and Portugal), we used the proportion ofdeaths between the two countries resulting from pollution for 2019 published by the Global Burden of Disease and we maintain this constant proportion. Finally, the exposure response functions used by the model are those described in Burnett et al. (2014). However, new research shows that the damage of the continuation could be underestimated, and indeed the premature deaths estimated by the European Environmental Agency166 are higher than the WHO estimates.

4.7. Conclusions

This analysis has made it possible to estimate the benefits of implementing the NECP in Spain, in terms of macroeconomics and public health. These results are similar to those obtained from other previous studies by various international bodies (IEA 2023, IRENA 2018 or OECD 2017). Based on the analysis carried out, the following can be concluded:

- Impact on investments: it is estimated that achieving the objectives of the NECP requires a cumulative investment of EUR 308.000 billion until 2030.

- Macroeconomic impacts: GDP increases by 3.2 % in 2030 compared to the baseline scenario. Job creation stands at 560.000 people/year in 2030. At industrial level, jobs stood at 77.000 jobs/year in 2030. However, as noted above, the generation of economic activity and employment will depend on sectors' ability to seize opportunities and minimise existing risks.

- Energy dependency: the reduction in the consumption of imported fossil fuels represents cumulative savings of EUR 86.750 billion until 2030 for the Spanish economy as a whole.

- Social impacts: the impacts are beneficial to all households, but they are relatively more beneficial for lower-income households. All

166httpsendeavour//www.eea.europa.eu/publications/air-quality-in-europe-2022/health-impacts-of-air-pollution

households, especially low- and middle-income households and other groups such as single-parent households or the elderly living alone, mostly composed of women, also benefit from lower energy bills.

- Health impacts: thanks to decarbonisation, air pollutant emissions are significantlyreduced. Premature deaths would fall by 49 % in 2030 compared to 2019, from 11.952 premature deaths to 6.095.

4.8. Bibliography

Arto, I., Kratena, K., García-Muros, X., Cazcarro, I., y/o Eguino, M. (2021) Model DENIO: Neokeynesiano Input-OutputDynamic Model Neokeynesiano for Spain, Energy Papers, 12.

Burnett, R.T., Pope, C.A., III, Ezzati, M., Olives, C., Lim, S.S., Mehta, S., Shin, H.H., Singh, G., Hubbell, B., Brauer, M., Ander son, H.R., Smith, K.R., Balmes, J.R., Bruce, N.G., Kan, H., Laden, F., Prüss-Ustün, A., Turner, M.C., Gapstur, S.M., Diver, W.R., Cohen, A., 2014. An Integrated Risk Function for Estimating the Global Burden of Disease Attributable to Ambient Fine Particulate Matter Exposure. Environ. Health Perspect.

IEA (2023) *Technology Energy Perspectives,* International Energy Agency, Paris.

IRENA (2018). Global energy transformation: A roadmap to 2050, International Renewable Energy Agency. httpsendeavour//www.irena.org/publications/2018/Apr/Global-Energy-Transition-A-Roadmap-to-2050

Kratena, K., Streicher, G., Temurshoev, U., Amores, A.F., Arto, I., Mongelli, I., Neuwahl, F., Rueda-Cantuche, J.M., Andreo- ni, V. 2013. FIDELIO 1: Fully Interregional Dynamic Econometric Long-term Input-Output Model for the EU27. LuxemBourg. European Commission. ISBN 978-92-79-30009-7.

Markandya, A., Sampedro, J., Smith, S.J., Van Dingenen, R., Pizarro-Irizar, C., Arto, I., i. eguino, M., 2018. Health co-benefits from air pollution and mitigation costs of the Paris Agreement: a modelling study. Lancet Planet. Health 2, e126 – e133 IRENA (2021),

OECD (2017). Investing in Climate, Investing in Growth, Organisation for Economic Co-operation and Development, Paris. httpsendeavour //www.oecd.org/env/investing-in-climate-investing-in-growth-9789264273528-en.htm

Van Dingenen, R., Dentener, F., Crippa, M., Leitao, J., Marmer, E., Rao, S., Solazzo, E., Valentini, L., 2018. TM5-FASST: a global atmospheric source-receptor model for rapid impact analysis of emission changes on air quality and short-listed CLImate pollutants. ATMOS Chem Phys 18, 16173 – 16211.

TABLE OF FIGURES

TABLE INDEX


NEXUS
A

INDEX

ANNEX A. CURRENT SITUATION AND PROJECTIONS: SCENARIO PNIEC 2023-2030

Table A.1 shows the main results of the PNIEC Scenario 2023-2 030 in relation to the existing and new European Objectives defined in the 'Objective 55' and 'REPowerEU' packages. The contour conditions defined in the Scenario and the detailed analysis of the above results are presented throughout the Annex.

Table A.1. Comparison of objectives and results between the NECP 2021-2030 and the updated document

		Results in 2030	
		NECP 2020	NECP 2023
Generals	GHG emissions reduction compared to 1990	23 %	32 %
	GHG emissions reduction compared to 2005 – ETS sectors	— 61 %	— 70 %
	GHG emissions reduction compared to 2005 – diffuse sectors	— 39.1 %	— 42 %
	Share of renewables in electricity generation	74 %	81 %
	Number of electric vehicles	5 million	5.5 million
	Number of dwellings rehabilitated	1.200.000	1.377.000
	Total and renewable power of the energy mix	Total: 160 GW REN: 113 GW	Total: 214 GW REN: 160 GW
	Renewable share of final energy	42 %	48 %
	Jca Energy Efficiency. Reduction of primary energy consumption	— 39.5 %	— 39.5 %
	Energy Efficiency Final Energy Consumption Reduction	— 41.7 %	— 43 %
	Energy dependency	61 %	50 %
Transport	GHG emission reduction in transport	— —	— 16.3 %
	Share of renewables in the transport sector	15 % *	28 %
	Combined percentage of RFNBO[167] + Advanced BIOS and biogas in Part A of Annex IX	2.1 %	17.26 %

167 **RFNBO: Renewable fuels of non-biological origin. Renewable Combusbles of non-biological origin**

Source: Ministry of Economic Affairs and Digital Transformation, 2022

The projection of GDP beyond the horizon of the stability programme corresponds to the macroeconomic scenario, built on the input-output tables of the Spanish economy. This scenario projects GDP growth in the decade 2020-2030 of 27 %.

The population projection contained in the Plan follows the Commission's projections (EUROPOP2023) corrected with the actual population data of the INE. As can be seen from the table below, the Spanish population grew by 2.15 % over the decade.

Table A.3. Projection of the Spanish population

Projection of the Spanish population (thousands of persons)			
Years	2020	2025	2030
Population	47.332	48.912	49.569

Industry	Annual increase in the share of renewable energy in industry	1.1 %	2.14 % (2021-2025) 2.97 % (2026-2030)
	Share of RFNBO in hydrogen in industry	25 % * *	74 %
Building, cooling heating	Final renewable energy in buildings	— —	67.6 %
	Annual increase in the share of renewable heating and cooling	0.83 % (2021-2025) 1.19 % (2026-2030)	1.42 % (2021-2025) 2.36 % (2026-2030)

** In the amendment to the Renewable Energy Directive, a change in the methodology for calculating this term has been established, meaning that the 28 % established in the previous NECP is 15 %.*
** * renewable Hydrogen Route Sheet*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A.1. EXPECTED EVOLUTION OF THE MAIN EXOGENOUS FACTORS INFLUENCING THE ENERGY SYSTEM AND GREENHOUSE GAS EMISSIONS

This first section sets out the main macroeconomic variables considered in the Ava Outlook exercise carried out in the Plan, in accordance with Regulation 2018/1999 on the Governance of the Energy Union and Climate Action.

Macroeconomic forecasts: GDP and population growth

The projection of the GDP variable has been provided by the Ministry of Economic Affairs and Digital Transformation (MINECO), updated in November 2022. The values can be found in the following table:

Table A.2. Spain's GDP projection

Projection of Spanish Gross Domestic Product (thousands of MEUR in constant 2016 prices)				
Years	2019	2020	2025	2030
GDP	1.197	1.060	1.236	1.345

The trajectory for the total number of dwellings is shown to be in line.

Table A.4. Projection of the number of dwellings

Projection of the number of dwellings (thousands of dwellings)					
Years	2016	2020	2025	2030	
Number of dwellings		18.378	18.754	19.699	20.312

Source: European Commission, Ins1tuto Nacional de Estadísísca 1ca

It should be noted that the number of dwellings comprises renovated, new and existing dwellings. Details of the measures associated with the renovation of dwellings can be found under Error**! The origin of the reference is not found.** It relates to the energy efficiency dimension.

Source: European Commission, Ins1tuto Nacional de Estadísísca 1ca

The number of dwellings is projected on the basis of the previous population projections, using the INE's housing occupation raad. This path is consistent with the one adopted in the update of the "Long-term Strategy for Energy Rehabilitation Aca in the Building Sector in Spain".

In addition to the above, it is estimated that the total number of households coincides with the total number of dwellings. In other words, all dwellings are considered to be inhabited. This scenario has been drawn up taking into account that this study is carried out to project energy consumption in the future, and the main consumption of Arán in dwellings.

‘Global Trends: International Combus Prices: Fossil Cables and Allowance Price

The Spanish Aco energy system is part of global energy trends and markets. Therefore, the values of the shut-down variables considered were those recommended by the European Commission.

At the same time, the ualised values for international fossil fuel prices and their projections up to 2030 are presented.

Table A.5. International prices for fossil fuels

International fossil fuel prices (EUR at constant 2016/barril oil equivalent prices)				
Years	2020	2021	2025	2030
Petroleum	35,2	57,0	66,2	74,1
Gas	17,2	83,7	47,7	45,6
Coal	8,8	20,7	20,8	20,5

Source: Recommended parameters for reporting 1 ng on GHG projections in 2025, European Commission, March 2024

In line with the assumption of price evolution of combusAbles in the table above, the European Commission has also provided international prices for the projection of the cost of allowances.

In the case of CO_2 emission allowances placed on the European market system, the evolution of their prices is an exogenous variable in the model. Therefore, the recommended parameters, presented in the following table, have been used.

Table A.6. Projection of the cost of the CO_2 allowance[168]

International prices of greenhouse gas emission allowances (Units: EUR in 2016/tCO constant prices$_2$)			
Years	2020	2025	2030
Cost of the allowance	22,81	82,80	82,80

Source: Recommended parameters for reporting 1 ng on GHG projections in 2025, European Commission, March 2024

Evolution of technological costs

The Ualised analytical model for the projection of the energy system, TIMES-Sinergia, is Apo *bo #* om-up, so the costs of the various energy technologies are a key input for the proper projection of the variable output disks of the model.

In order to ensure the consistency of the related prices between the different technologies, the data provided by the JRC of the European Commission in the Power model have been preferably used. For all the data not available in the two sources referred to above, recourse has been made to commonly accepted international sources, possibly adapting the values to the usual support in the Spanish energy system.

The cost evolution of the various technologies has been taken from various international sources and, if available, from national expert sources. The main sources, broken down by sector considered, are summarised as follows:

Table A.7. Data sources for the evolution of technological costs

Sources of data	
Sector	**Source of data**

[168] **Data recommended by the European Union for the Reference Scenario. The values of the so-called ‘Recommended EU ETS carbon prices’ are implemented.**

Transport	EU Reference Scenario 2016, Energy, transport and GHG emissions Trends to 2050. Input data to PRIMES model, 2016
Residential	Energy Technology Data Source, IEA ETSAP – Technology Brief, 2012
Services	JRC. Input data to POTEnCIA Model, 2018
Power generation	JRC. Power generation technology assumptions, developed to serve as input to the POTEnCIA
Industry	Energy Technology Data Source, IEA ETSAP – Technology Brief, 2010-2015

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

As regards heating and cooling days, these parameters have not been used in modelling, and therefore the projections provided by the European Commission have not been used.

A.2 DIMENSION OF DECARBONISATION

Once the main exogenous variables have been set out, the description of the Scenario in the various dimensions included in the Plan is changed. This section begins with decarbonisation, which in turn consists of two areas: reducing GHG emissions and promoting renewable energy.

A.2.1 Greenhouse gas emissions and removals

The objection of reducing GHG emissions by 32 % compared to 1990 is consistent with reaching climate neutrality by 2050 and contributing to the objective of reducing emissions in the EU globally by 55 %. Achieving this level of decarbonisation is only possible with the implementation of the measures provided for in this Plan, and the implementation of the energy efficiency first principle, the production of energy from renewable sources or the electrification of energy end uses are key levers.

The following tables present the total GHG emissions corresponding to the PNIEC Scenario 2023-2030, detailed by sector.

Table A.8. Projection of total emissions in the PNIEC Scenario 2023-2030

Emission projection in PNIEC Scenario 2023-2030 ($ktCO_2eq$)169							
Years	1990	2005	2015	2019	2020	2025	2030
Transport	58.651	102.842	83.730	91.408	73.868	82.478	59.577
Production of electricity	65.856	112.781	74.098	44.028	30.751	13.436	12.102
Industrial sector (combustion)	44.880	69.884	42.216	46.866	41.767	35.463	28.197
Industrial sector (process emissions)	27.345	31.509	20.591	18.549	16.923	16.850	16.817
Residential, commercial and institutional sectors	17.629	30.926	26.096	25.588	25.291	19.989	14.117
Agriculture	32.924	34.920	33.046	33.907	34.990	31.746	28.439
Waste	13.535	15.425	16.149	14.718	14.652	12.954	11.322
Refining industry	10.878	11.877	10.452	10.229	9.245	7.968	5.670

The169 projected emissions for 2025 and 2030 are s1uses of the Spanish Inventory System for 1r of the results of the Energy Scenario 1-2023 of the PNIEC -2030. Emissions up to 2020 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In addition, the disaggregated emissions between those subject to the emissions trading system and those that are excluded (diffuse emissions) are presented. The following tables detail the disaggregated results for the PNIEC Scenario 2023-2030.

Other energy industries	2.117	1.036	656	989	785	831	757
Other sectors	9.092	11.744	12.713	12.754	12.699	11.640	11.096
Fugitive emissions	3.759	3.249	4.053	3.888	3.785	3.239	2.338
Use of products	553	958	641	920	945	1.024	1.069
Fluorinated gases	66	10.597	8.748	5.739	4.968	4.543	3.688
Total	287.286	437.749	333.190	309.583		270.669 242.161	195.189

Table A.9. Emission projection in emissions trading sectors

Projection of emissions in the PNIEC Scenario 2023-2 030 in sectors subject to trade allowances ($ktCO_2eq$)170						
Years	2005	2015	2019	2020	2025	2030
Transport	3.998	2.486	3.126	1.516	4.904	4.917
Production of electricity	103.897	70.972	41.379	28.459	11.558	11.132
Industrial sector (combustion)	54.094	34.955	38.127	33.983	28.807	22.862
Industrial sector (process emissions)	28.440	17.841	15.823	14.318	14.346	14.375
Residential, commercial and institutional sectors	46	99	111	109	79	57
Agriculture	0	0	0	0	0	0
Waste	0	0	0	0	0	0
Refining industry	11.877	10.452	10.229	9.245	7.968	5.670
Other energy industries	772	488	736	584	619	564
Other sectors	0	0	0	0	0	0
Fugitive emissions	1.498	2.578	2.465	2.395	2.077	1.478
Use of products	0	0	0	0	0	0
Fluorinated gases	0	0	0	0	0	0
Total HTA	204.621	139.871	111.997	90.608	70.357	61.057

** The 1 and 2025 emission projections are s1uses of the Spanish Inventory System for 1r of the results of the Energy Scenario 2030-2030 of the PNIEC. Emissions up to 2020 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Table A.10. Emission projection in diffuse sectors

Projection of emissions in PNIEC Scenario 2023-2 030 in diffuse sectors ($ktCO_2eq$) *						
Years	2005	2015	2019	2020	2025	2030
Transport	98.844	81.244	88.282	72.352	77.574	54.660
Production of electricity	8.885	3.126	2.648	2.292	1.878	970
Industrial sector (combustion)	15.791	7.261	8.739	7.784	6.656	5.335
Industrial sector (process emissions)	3.069	2.750	2.726	2.604	2.504	2.441
Residential, commercial and institutional sectors	30.881	25.997	25.476	25.182	19.910	14.059
Agriculture	34.920	33.046	33.907	34.990	31.746	28.439
Waste	15.425	16.149	14.718	14.652	12.954	11.322
Refining industry	0	0	0	0	0	0
Other energy industries	265	168	253	201	212	194
Other sectors	11.744	12.713	12.754	12.699	11.640	11.096
Fugitive emissions	1.751	1.476	1.423	1.390	1.162	860
Use of products	958	641	920	945	1.024	1.069
Fluorinated gases	10.597	8.748	5.739	4.968	4.543	3.688
Total	233.128	193.318	197.585	180.060	171.804	134.133

As shown in the tables above, the main GHG emission reductions occur in the electricity generation and mobility and transport sectors. The industrial and residential, commercial and economic sectors also make an important contribution to meeting the objective of reducing emissions.

In conclusion, the central objection set out in this Plan is the reduction of GHG emissions by at least

The 1 and 2025 emission170 projections are s1uses of the Spanish Inventory System for 1r of the results of the Energy Scenario 2030-2030 of the PNIEC. Emissions up to 2020 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

32 % in 2030 compared to 1990 and by 55 % compared to 2005.

A.2.2 Renewable energy

In addition, results and projections of the contribution of renewable energy production to final energy consumption are included.

Contribution of renewable energy to gross final energy consumption

The calculation of the share of energy from renewable sources is currently defined in Article 7 of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources and the amendments introduced by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023.

In that regard, row 7.1 states as follows:

> *'1. The gross final consumption of energy from renewable sources in each Member State shall be calculated as the sum of:*
>
> *a) gross final consumption of electricity from renewable sources;*
>
> *b) gross final consumption of energy from renewable sources in the heating and cooling sector; and*
>
> *c) the final consumption of energy from renewable sources in the transport sector.'*

Row 7.1 further states that gas and electricity from renewable sources will only be counted once for the calculation of the share. Furthermore, energy produced from renewable combs of non-biological origin (RFNBO) shall be accounted for in the sector consumed: electricity, heating and cooling, or transport. The object of these two provisions is to avoid double counting of renewable energy in two or more sectors, which would cause renewable energy consumption to be overexploited.

The specific methodology used to calculate the gross final consumption of renewable energy in each sector is set out below: electricity, heating and cooling, and transport.

- Electricity. Gross final consumption of electricity from renewable sources has been calculated in accordance with Article 7.2 of the Directive, which defines it as the amount of electricity produced in a Member State from renewable sources, including both the production of electricity from renewable self-consumers and renewable energy communities and electricity from renewable combusAbles of non-biological origin, and excluding both electricity produced in pumped storage units of water that has previously been pumped uphill and electricity used to produce renewable fuels of non-biological origin.

- Heating and cooling. Gross final consumption of energy from renewable sources in the heating and cooling sector has been calculated, according to Box 7.3 of the DirecAva, as the district heating and cooling capacity produced in a Member State from renewable sources, plus the consumption of other energy from renewable sources in industry, households, services, agriculture, forestry and fisheries for heating, cooling and process purposes.

  It should be stressed at this point that the DirecAva defines the conditions for counting as renewable energy ambient energy and uAlised geothermal energy for heating and cooling by means of heat pumps, to be calculated in accordance with Annex VII. In this Senate, the Commission adopted Commission Delegated Regulation (EU) 2022/759 of 14 December 2021 amending Annex VII to Directive (EU) 2018/2001 of the European Parliament and of the Council as regards a methodology for calculating the uAlied renewable energy canadad

for cooling and district cooling. This Regulation has led to a change in the calculation of the renewable share compared to the NECP 2021-2030, as the new methodology for cooling applications requires much more restrictive equipment performance compared to heating applications. Thus, even though the 2023-2030 NECP envisages a greater deployment of heat pumps, the energy from heat pumps that can be counted towards the calculation of the renewable share is lower than that set out in the PNIEC 2021-2030.

- Transport. The final consumption of energy from renewable sources in the transport sector has been calculated in accordance with Article 7.4 of the DirecAva, as the sum of all biofuels, biogas and renewable fuels of non-biological origin consumed in the transport sector. Renewable combusAbles supplied to international marine combat tanks are also included.

Finally, according to Article 7.5 of the Directive, the share of energy from renewable sources shall be calculated by dividing the gross final consumption of energy from renewable sources by the gross final consumption of energy from all energy sources. Gross final consumption of energy is defined in Article 2 (4) as energy products supplied for energy purposes to industry, transport, households, services including public utilities, agriculture, forestry and fisheries, the consumption of electricity and heat by the energy branch for the production of electricity and heat, and losses of electricity and heat in distribution and transport. In particular, for the calculation of the renewable share, a limit on the energy consumed in aviation according to the third subparagraph of arch 7.5 shall be taken into account.

Table A.11 shows the calculation of the total share of renewable energies in gross final energy consumption. The results up to 2022 correspond to the data officially reported by the Kingdom of Spain to Eurostat171, while the projections for 2025 and 2030

171Share of renewable energy and details of the calculation of the overall share

are the results of the Energy Scenario of the PNIEC 2023-2030. As explained above, these projections have been calculated in accordance with the most recent methodology set out in the aforementioned Article 7 of Directive 2018/2001.

Table A.11. Share of renewable energy in final energy consumption in the PNIEC Scenario 2023 – 2030

Share of renewable energy in final energy consumption in the PNIEC Scenario 2023-2030									
		Years172 DER III		2019	2020	2022	2025	2027	2030
Agricultural Consumption (ktoe)		7.1 (b)					159	173	207
EERR for use final (excluding consumption	Industry (ktoe)	7.1 (b)		4.229	4.116	4.241	2.239	2.372	2.902
	Residential (ktoe)	7.1 (b)					2.281	2.344	2.619
	Electrical services and other (ktoe)	7.1 (b)					376	414	541
RENOVAbl (*)	Transport (ktoe)	7.1 (C)		1.762	1.536	1.446	2.410	2.986	3.850
Energy delivered by heat pumps (ktoe)		7.1 (b)		849	960	1.211	1.506	1.832	2.561
Renewable electricity generation (ktoe)		7.1 (a)		8.943	9.846	11.736	17.531	20.299	24.451
Total renewable energy (ktoe)		7.1 (a) + (b) + (c)		15.783	16.458	18.633	26.503	30.421	37.295
Final energy corrected by power system losses, aviation consumption and energy supplied by heat pumps (ktoe)		7.5		88.413	77.562	84.251	83.334	81.234	77.925
Share of renewable energy in final energy consumption		Article 7		17.85 %	21.22 %	22.12 %	31.80 %	37.45 %	47.86 %

Renewable energy in heating and cooling applications

Heat and cold applications include the following sectors: residential, services and industry.

The results of this contribution are presented in the table below.

172In 2019 and 2020, the methodology of Directive 1va 2009/28/EC (RED I) was applied, in 2022 the methodology of Directive 1va (EU) 2018/2001 (RED II) was applied and in the 2025-2030 projections the methodology of Directive 1va (EU) 2018/2001 as amended by Direc1va (EU) 2023/2413 (DER III) was applied.

In the table, electricity consumed in transport is accounted for in renewable electricity generation and not in the transport sector.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The table above shows how a share of renewable energy in gross final energy consumption of 48 % in 2030 is achieved.

Comments are made on the main causes of this increase:

- The largest contribution of renewable energy in the scenario is renewable electricity generation with 33 percentage points out of 48, due to renewable generation promotion policies
- The contribution of heat pumps increases by 167 % compared to 2020

Gains in energy savings and efficiency Aca increase the contribution of renewables in percentage terms, due to their effect on the reduction of final energy consumption.

In addition, the sectoral disaggregation of renewable energy shall be presented.

Table A.12. Share of renewable energy in heating and cooling

Share of renewable energy in heating and cooling applications				
	Years 2019	2020	2025	2030
PNIEC scenario 2023-2030 17 %	18 %	25 %	37 %	

** In 2019 and 2020, direct methodology 2009/28/EC (RED I) was applied. The rest are projections made by MITECO using the methodology of Directive 1va 2018/2001 (DER III).*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In the results of the above table, and consistent with the evolution of the overall percentage, the PNIEC Scenario 2023-2030 shows an increase in the share of renewable energies in heating and cooling in 2030. The main conclusions in this regard are set out:

- The promotion of the use of renewable end-use energy, such as biomass, biogas and solar thermal energy, has a significant impact on increasing this percentage.
- Greater penetration of heat pumps for climate change by installation in new dwellings, as well as in a significant number of renovated dwellings, Aene also having a significant impact Avo

As regards objection 11relates to the integration of renewable energy in the heating and cooling sector as defined in Article 23 of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 relating to the promotion of the use of energy from renewable sources and the amendments introduced by Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023, that framework provides that in *order to promote the use of renewable energy in the heating and cooling sector, each Member State shall increase the share of renewable energy in that sector by at least 0,8 percentage points on an annual average calculated for the period from 2021 to 2025, expressed in terms of gross energy consumption in the heating and cooling sector, from 1,1 to minus 2026 percentage points of annual average energy consumption, calculated for the period from 2030 to 2020, and to the annual share of renewable energy in the heating and cooling sector, as defined in Article 7 of Directive (EU)/of the European Parliament and of the Council of on the promotion of the use of energy from renewable sources on the promotion of the use of energy from renewable sources and the amendments introduced by Directive (EU) of the European Parliament and of the Council of on promoting the use of renewable energy in the heating and cooling sector, each Member State shall increase the share of renewable energy in that sector by at least percentage points on an annual average calculated for the period from to, expressed in terms of gross energy use in the heating and cooling sector, and by percentage points of renewable energy in the annual average of percentage points calculated for the period from to, expressed in terms of gross energy consumption in the heating and cooling sector, and by minus percentage points of renewable energy in the annual average, calculated for the period from to, expressed in terms of gross energy consumption in the heating and cooling sector, from to of the European Parliament and the Council of relating to the promotion of the use of energy from renewable sources and the amendments introduced by Directive of the European Parliament and of the Council of on the promotion of the use of renewable energy in the heating and cooling sector by at least percentage points per year on average, calculated for the period from to, and by percentage points per year from to of the European Parliament and of the Council of.*

Following the methodology set out in Box 7, the calculation of the share of renewable energy in the heating and cooling sector is calculated following the methodology set out in Annex VII to Directive (EU) 2018/2001 for the accounting of renewable energy from spent heat pumps for heating and Delegated Regulation (EU) 2022/759 for cooling and district cooling.

The DirecAva provides that *Member States may count uJlizada renewable electricity for heating and*

cooling in the average annual increase set out in the first subparagraph, up to a limit of 0,4 percentage points, provided that the efficiency of the unit of heat and cold production is higher than 100 %. If they decide to do so, the average annual increase shall increase by half of that renewable electricity expressed in percentage points to an upper limit of 1,0 percentage points for the period 2021 to 2025 and of 1,3 percentage points for the period 2026 to 2030.

At the same time, and in order to achieve the average increase of 1,8 percentage points at Union level, Annex Ia establishes for Space an indicative share of energy from renewable sources for heating and cooling in gross final energy consumption for 2020-2030 of 0,9 points for the period 2021-2025 and 0,6 for the period 2026-2030, resulting in a share for both periods of 1,7 percentage points.

Table A.13. The objective of renewable energy in the heating and cooling sector shows the objection of renewable energy in the heating and cooling sector:

Table A.13. Objective of renewable energy in the heating and cooling sector

Share of annual average renewable energy in heating and cooling		
Period	2021 – 2025	2026 – 2030
Purpose DER III	0.8 %	1.1 %
PNIEC scenario 2023-2030	1.32 %	2.24 %
PNIEC scenario 2023-2030 accounting for renewable electricity	1.42 %	2.36 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Transport

The amendment to Directive (EU) 2018/2001 increases the ambition of the renewable objections in transport and introduces new Objectives in terms of increasing renewable energy in final energy consumption and reducing greenhouse gas intensity in the transport sector, as well as a share of advanced biofuels and biogas produced from feedstock listed in Part A of Annex IX and renewable combustion of non-biological origin in the energy supplied to the sector, following the calculation rules set out in Article 27.

In this regard, Box 25.1 points out that the draught of renewable combusAbles and renewable electricity supplied to the transport sector must lead to:

- share of renewable energy within the final consumption of energy in the transport sector of at least 29 % by 2030; or
- a reduction in greenhouse gas intensity of at least 14.5 % by 2030;
- a combined share of advanced biofuels and biogas produced from feedstock listed in part A of Annex IX and of renewable combustion materials of non-biological origin in the energy supplied to the transport sector is at least 1 % in 2025 and 5.5 % in 2030
- a share of at least 1 percentage point from renewable combs of non-biological origin in 2030.

In addition, Directive 2018/2001, as amended, introduces that *in the event that in a Member State the proportion of biofuels and bioliquids, as well as of biomass combusJbles consumed in transport, produced in parJr of food and feed crops is limited to less than 7 % or if a Member State decides to further limit the proportion, that Member State may reduce the minimum share of renewable energy or the greenhouse gas intensity reduction objective accordingly. For the purposes of the greenhouse*

gas intensity reduction objection, Member States shall consider such combat Jbles to reduce greenhouse gas emissions by 50 %.

In the case of Spain, as regards the proportion of biofuels and bioliquids and biomass combusAbles consumed in transport produced from food and feed crops, an objection of 2.6 % has been established, meaning that the resulting share of energy for Spain is 24.6 % and the objection resulting from a reduction in greenhouse gas intensity is 12.3 %.

The following table shows the GHG emission intensity reduction due to the use of renewable fuels in transport:

Table A.14. Reduction of GHG emission intensity by the use of renewable fuels in the transport sector will decarboni

Reduction of GHG intensity in transport				
	Years 2019	2021	2025	2030
PNIEC scenario 2023-2030	2.25 %	3.12 %	6.04 %	16.30 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The following table shows the shares of renewable energy in the transport sector in relation to their final energy consumption. To this end, the values obtained by applying the methodology of amending Directive 2018/2001 on the promotion of the use of energy from renewable sources have been represented.

Table A.15. Share of renewable energy in the transport sector

Share of renewable energy in the transport sector				
	Years 2019	2020	2025	2030
PNIEC scenario 2023-2030	8 %	9 %	12 %	28 %

** In 2019 and 2020, direct methodology 2009/28/EC (RED I) was applied. The rest are projections made by MITECO using the methodology of Directive 1va 2018/2001 (DER III).*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In addition, we analyse the main causes leading to a very significant reduction in GHG emission intensity due to the use of renewable fuels and a very significant increase in the presence of renewable energies in transport:

- **Modal shift towards more efficient modes of transport and increased deployment of teleworking. The**change of transport mode proposed in the PNIEC Scenario 2023-2030 towards means of transport collector Avo results in a much more efficient sector, which, together with the increase in teleworking, leads to an increase in ambition in the transport objections.
- **Accelerated introduction of electric vehicle in PNIEC Scenario 2023-2030. In 2030**, Arán had a total of 5.5 million electric vehicles in the Aco fleet, including electric cars, motorcycles, light lorries and buses. The introduction of electric mobility is gradual to reach that figure in 2030.
- **Increasing mobility through electrified rail transport, as well as the entry of renewable hydrogen. It is**also of significant importance, provided that, as in the previous point, electricity generation comes from renewable sources. In addition, in line with *the Hydrogen Roadmap,* in 2030 there were 2 commercial lines of hydrogen-powered trains in Arán, where electrification is not economically viable.
- **Use of advanced biofuels and biomethane**. The contribution of these fuels produced from the raw materials listed in Part A of Annex IX to Directive 2018/2001 complies with the minimum laid down.

- **The increase in sustainable aviation $Combus (SAF) in aviation in** line with the objectives set out in Regulation (EU) 2023/2405, which relates to fair conditions of competition for sustainable air transport, which considers a minimum of 2 % of sustainable aviation biocombubles per year to stop in 2025 and 6 % since 2030, of which 1.2 % during the two-yearperiod 2031 will be synthetic, with a minimum of 0.7 % per year.

- With regard to the **Marí $mo sector**, Regulation (EU) 2023/1805 on the use of renewable and low-carbon combat fuels in maritime transport sets a GHG emission intensity limit for shipping companies for energy consumed by ships, with reductions from the baseline value ranging from 2 % in 2025 to 80 % in 2050, with specific targets for renewable fuels of non-biological origin (RFNBOs) from 2034.

The following table presents the above limits laid down in Directive 2018/2001 on the promotion of the use of energy from renewable sources, as well as their degree of compliance. As can be seen from the data submitted, the minimum and maximum levels established by the Directorate-General for Biofuels and Biofuels in 2030 have been complied with.

Table A.16. Compliance with the limits laid down in Directive 2018/2001 in the transport sector

Compliance with limits laid down in Directive 2018/2001 (DER III)						
	Component	2019	2020	2025	2030	Objective 2030
Article 27.2 (f)	Biogas and biofuels. Annex IX, Part B	0.6 %	2.0 %	0.9 %	1.1 %	Maximum 1.7 %
Article 25.1	Biogas and advanced biofuels. Annex IX, Part A	0.1 %	0.5 %	7.3 %	6.9 %	Minimum 3.5 %
Article 26. 1	Biofuels produced to brokers of food and feed crops	5.2 %	4.0 %	1.8 %	1.5 %	Maximum 4 %
Article 25.1 (b)	Biogas and advanced biofuels. Annex IX, Part A and RFNBO		0.2 %	6.6 %	17.3 %	Minimum 5.5 %

** In 2019 and 2020, direct methodology 2009/28/EC (RED I) was applied. The rest are projections made by MITECO using the methodology of Directive 1va 2018/2001 (DER III).*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

On the other hand, **Order TED/1342/2022 of** 23 December establishing the limit for biofuels produced from food and feed crops for the purposes of the objection of sale or consumption of biofuels and biogas for transport purposes established a limitation of biofuels produced from food and feed crops of 3.5 %, 3.0 % and 2.6 % in 2023, 2024 and 2025 respectively, extended to 2026 as soon as no additional limits are set.

The production of biocombusAbles from feedstocks listed in Annex IX part A of Directive 2018/2001 will compensate for the reduction of biofuels produced from food and feed crops. In the case of Spain, in accordance with Order TED/728/2024, for 2025, it will not be possible to count towards the sales objections of those whose raw material is the palm'.

Renewable energy in the electricity sector

This section begins with the results relating to the generation of renewable energy in the electricity generation park, which are shown in the following terms:

Table A.17. Share of renewable energy in the electricity generation sector

Share of renewables in electricity generation				
Calculation method	2019	2020	2025	2030
Renewable Energy Directorate (RES-E)	37 %	43 %	71 %	87 %
Direct percentage	37 %	43 %	67 %	81 %

** The data for 2019 and 2020 are real (RED I), the rest are projections made by MITECO using the methodology of RED III.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In Table A.17. The percentage of renewable energy in the electricity generation sector shows the percentages of renewable generation in the electricity sector in relation to final energy, applying the calculation of direct raAo, as well as under the methodology set out in the corresponding Renewable Energy Directive (RED) version. The numerator is calculated in accordance with the provisions of Section 7.2 of the DirecAva set out above. For the denominator, as it is not explicitly defined in the DirecAva, it has been calculated in a similar way to the SHARES tool, which applies the RED II methodology taking into account the new provisions of RED III. It has therefore been calculated for this case as gross electricity generation from all energy sources excluding both electricity produced in pumped storage units of water that has previously been pumped uphill, batteries and other storage technologies, such as electricity used to produce renewable fuels of non-biological origin, plus total electricity imports minus total electricity exports. In 2022, the RES-E share calculated according to the RED II methodology reached a value of 51 %, with an expected share of 87 % in 2030, already under the RED III methodology.

In the case of the direct percentage, a renewable contribution of 81 % was achieved in 2030, which was achieved by dividing all the renewable electricity generated in the system, including self-consumption, between the electricity generated by all sources. Storage is excluded for the calculation of the direct percentage.

A detailed account is given on the electricity sector, given that this is one of the most important parts of the contribution to the decarbonisation of the energy system, as well as to meeting the renewable energy objection.

Electricity

In the PNIEC Scenario 2023-2030, the total installed capacity increased to 214 GW in 2030, an increase of 86 % over the decade (99 GW).

The main increases come from wind (onshore and offshore) and solar photovoltaic technologies, with an increase of approximately 35 GW and 65 GW respectively. It should be borne in mind that, although renewable totals are committed by the NECP, the relative figures for the various technologies are indicative and susceptible to change depending on technological developments, the costs and the availability of the various technologies. Similarly, these figures include the different apologies of existing and future technologies, giving examples and not being exclusive: distributed and conventional generation power, onshore and offshore wind power, large photovoltaic generation plants and self-consumption. These figures also include the powers dedicated to electrolysers.

Table A.18. Electricity generation park in the PNIEC Scenario 2023-2030

Scenario Generation Park. Gross power (MW)				
Years	2019	2020	2025	2030
Wind	25.083	26.754	36.149	62.054
Solar Photovoltaic	8.306	11.004	46.501	76.277
Solar thermoelectric	2.300	2.300	2.304	4.804
Hydraulic	14.006	14.011	14.261	14.511
Biogas	203	210	240	440
Other renewables	0	0	25	80
Biomass	413	609	1.009	1.409
Coal	10.159	10.159	0	0
Combined cycle	26.612	26.612	26.612	26.612
Cogeneration	5.446	5.276	4.068	3.784

Fuel and Fuel/Gas (Non-Peninsular Territories)	3.660	3.660	2.847	1.830
Waste and other	600	609	470	342
Nuclear	7.399	7.399	7.399	3.181
Storage *	6.413	6.413	9.289	18.913
Total	111.101	115.015	151.173	214.236

* *Including solar thermoelectric storage reaches 22.5 GW.*

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In addition, it should be noted that storage technologies reach a total of 22.5 GW of storage in 2030, broken down into 12.5 GW of daily and weekly storage, and 10 GW of seasonal storage, including both storage associated with solar thermoelectric generation plants and other storage technologies, exceeding the forecasts of the Aco Energy Storage Strategy. This power is the result of the implementation of an integrated approach combining daily, weekly and seasonal storage options in order to reduce verAdos and maximise the production capacity of renewable non-gesAonable technologies.

In addition, there is an increase in other renewable technologies in the period considered, reaching a value of 80 MW, including geothermal energy and marine energies.

In sum, renewable power is increased by approximately 105 GW in the period 2021-2030, with the total renewable capacity at that date being 160 GW.

Moreover, over the period 2021-2030 there is a decrease of 4 GW in installed nuclear power (corresponding to four of the seven reactors currently in operation). This decline is part of the plan for the orderly, phased and flexible cessation of operation of existing nuclear reactors, which foresees the cessation of operation of the other three reactors in the period from 2031 to 2035.

The Subject Scenario of the PNIEC 2021-2030 provided for the cessation of all coal-fired electricity generation by 2030. However, economic, technical and regulatory developments have led to all coal-fired thermal power plants in the country having now completed their closure, are in the process of being closed or are subject to medium-term closure plans, meaning that the total closure of coal could take place around 2025. As a result, all coal in Spain is expected to close within the timeframe of the implementation of the Just Transition Fund (2021-2027).

The main reason for this cessation prior to 2030 will be the difficulty of coal-fired heating to connuar, being profitable in an environment strongly influenced by the European response to the climate change, where the price of the tonne of CO_2 will be at least EUR 83. In any event, completion of the electricity generation of coal-fired thermal power plants is considered essential in order to achieve the GHG MiAgation Plant Objection of this National Plan, of at least 32 % in 2030 compared to 1990 and 55 % in comparison with 2005.

It should also be noted that the entire existing renewable fleet is planned to be repowered after the end of its lifetime, building on the **renovation and hybridisation measures on existing projects** incorporated in this NECP.

It should be pointed out that the primary objective of the electricity system is to ensure, under the optical conditions of safety and quality of service, the supply of electricity to consumers. According to the feasibility studies carried out in relation to the proposed generation fleet, **it will not be necessary to install additional back-up thermal power as a complement to the generation mix obtained from the TIMES-Sinergia[4] model.**

In any event, REE, as System Operator, shall at all times ensure the proper functioning of the transmission and distribution systems, as well as the electricity supply.

As explained above, the high penetration of renewable power into the electricity generation system will be accompanied by the following actions:

- Development of energy storage, as well as other flexible services such as the demand side.
- The recent revision at European level of the internal electricity market, so that its new design will lead to new investments in renewable energy, energy storage Aco and demand side.
- Promotion of the necessary network infrastructure.
- Maximising the use of available access capacity through efficient power allocation procedures.
- Simplification of the administrative and environmental processing of plant authorisations, so that this process does not become a brake on the construction of the generation facilities and the infrastructure needed to set them up, especially in the case of repowering.

Once the power park has been exposed, the results relating to electricity generation[5]are shown:

Table A.19. Gross electricity generation in the PNIEC Scenario 2023-2030

Gross electricity generation in PNIEC Scenario 2023-2030 (GWh)				
Years	2019	2020	2025	2030
Wind (onshore and offshore)	55.647	56.444	74.721	130.102
Solar Photovoltaic	9.420	15.675	83.228	138.307
Solar thermoelectric	5.683	4.992	5.553	11.945
Hydraulic	24.646	30.507	31.518	28.764
Storage	2.228	3.491	14.280	25.099
Biogas	699	699	1.289	2.640
Geothermal	0	0	94	188
Marine energy	20	27	27	142
Coal	14.003	5.775	0	0
Combined cycle	57.614	45.916	14.446	20.153
Coal-fired cogeneration	243	221	0	0
Gas-fired cogeneration	29.025	27.177	15.739	13.475
Cogeneration petroleum products	3.108	2.481	1.534	849
Others	988	1.152	1.816	1.608
Fuel/Gas	5.941	4.374	6.775	3.975
Renewable cogeneration	1.094	1.091	1.920	1.881
Biomass	3.009	3.646	4.266	8.029
Cogeneration with waste	192	140	122	84
Municipal solid waste	1.348	1.266	0	0
Nuclear	58.349	58.299	56.237	35.172
Total	273.257	263.373	313.565	422.413

[4] as can be seen in Annex D, the electricity generation fleet resulting from the TIMES- Synergy model was analysed by Red Eléctrica de España.

[5] the generation values for 2019 are based on the values reported to Eurostat for that year, having made the necessary calculations in accordance with the breakdown submitted.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Table A.20. Electricity balance of the PNIEC Scenario 2023-2030

Electricity balance in Scenario 2023-2030 (GWh)				
Years	2019	2020	2025	2030
Gross electricity generation	273.257	263.373	313.565	422.413
Consumption at generation	— 9.461	— 8.782	— 7.244	— 7.207
Net electricity generation	263.796	254.591	306.320	415.206
Consumption in storage	— 3.025	— 4.620	— 17.850	— 30.342

Export	— 11.859	— 14.649	— 25.675	— 41.375
Import	18.721	17.928	14.305	14.208
Plant bar demand	267.633	253.251	277.101	357.697
Consumption in the energy transformation sector	— 7.636	— 7.517	— 9.472	— 55.823
Losses on transport and distribution	— 24.790	— 25.631	— 26.209	— 28.069
Final electricity demand in non-energy sectors	235.207	220.103	241.420	273.805

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Table A.20 shows the electricity balance between generation and demand of all electricity in the PNIEC Scenario 2023-2030. Firstly, the gross electricity generation of all technologies, including the production of storages, is assumed in Table A.19. Subsequently, ancillary consumption at generation, storage consumption and international balances on interconnections are discounted to obtain demand in plant bars. By way of addition, this demand is disaggregated into the electricity consumed in the energy transformation sector, the losses during the transmission and distribution of electricity and the demand of the final sectors. Following the methodology defined in Regulation (EC)No 1099/2008on energy statistics, the transformation sector includes electric energy used for the production of combusAbles, such as electricity consumed in refineries or for the production of other energy carriers such as green hydrogen.

Main conclusions concerning PNIEC Scenario 2023-2030:

- Final electricity demand is from 235 TWh in 2019 to 274 TWh in 2030, an increase of 16.4 %. Another aspect to be highlighted is the increase in demand from the processing sector by 50 TWh over the decade, increasing by 665 %.
- The electricity demand in plant bars increases by 90 TWh compared to 2019 and 77 TWh in relation to the calculations in the PNIEC 2021-2030 for 2030.
- The net border balance is clearly exporting in 2030, reaching 27 TWh. This balance is driven by the high penetration of renewable power into the system.
- The share of renewable generation in the electricity sector increases by 44 percentage points in this period, from 37 % in 2019 to 81 % in 2030.

Industry

The RED III sets out, in Article 22a, an indicative increase in the share of renewable sources used for final energy and non-energy purposes in the industry sector by at least 1,6 percentage points as an annual average calculated for the periods 2021 to 2025 and 2026 to 2030.

Table A.21. Objective of renewable energy in the industrial sector

Increase in the share of annual average renewable energy in the sector industry		
Period	2021 – 2025	2026 – 2030
PNIEC scenario 2023-2030	2,14 %	2,97 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In order to achieve such an indicative increase in the share of renewable energies in industry, Spain will implement a series of policies and measures indicated in Measure 1.10 Decarbonisation of the industrial sector of this Plan.

Furthermore, the same Article 22 establishes an objection to renewable combats of non-biological origin used as final energy and non-energy purposes of 42 % of the hydrogen used as final energy and for non-energy purposes in industry by 2030, and 60 % by 2035.

The result relating to RFNBOs' share of hydrogen used in industry shows that:

Table A.22. RFNBOs object on hydrogen in industry

Share of RFNBOs in hydrogen in industry	
	2030
PNIEC scenario 2023-2030	74.46 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Building

RED III establishes, as objectionAvo indicaAvo, a minimum share of 49 % of energy from renewable sources in the building sector in the building sector in the Union's final energy consumption in buildings in 2030. The frame indicates that Member States should include their national share indicated Ava in the integrated national energy and climate plans.

To this end, the result relating to the share of renewable energy in the construction sector shows that:

Table A.23. Objective of renewable energy in the building sector

Share of renewable energy in construction	
	2030
PNIEC scenario 2023-2030	67.59 %

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

In order to achieve this objection Avo indicaAvo in terms of the share of renewable energies in buildings, Spain will launch a series of polyacas and measures indicated in Measure 1.11. Framework for the development of renewable thermal energy in this Plan, namely through the large-scale deployment and integration of renewable thermal technologies in all sectors of the economy (ambient and geothermal heat pumps, concentrated and non-concentrated solar thermal, geothermal use or biomass), the renovation of the installed solar thermal park, the emergence of obsolete ambient energy equipment by high-efficiency ones, the renovation of biomass equipment by high-performance ones or the hybridisation of renewable technologies to reach the 'nearly zero-energy building'.

A.3 ENERGY EFFICIENCY DIMENSION

This heading refers to the effects of policies and measures on energy efficiency in the various sectors of the economy. We have previously commented that one of the vectors that has guided the development of the Plan is the reduction of GHG emissions. Within the measures proposed, there are two main directions for this:

- The denial of fossil fuels by other less polluting or more efficient energy sources.
- The reduction in energy consumption for saAsfacer the same demands, or the same, the increase in energy efficiency, which is the subject of this section.

A.3.1 Primary energy consumption

Primary energy consumption or CEP is defined according to Directive 2023/1791 relating to energy efficiency Aca as gross available energy excluding international bunkers, final non-energy consumption and ambient energy.

The following table sets out the aggregate primary energy of all sectors for the PNIEC Scenario 2023-2030 following the methodology of the Aca Energy Efficiency Directory and including non-energy uses. The primary energy consumption described above can be obtained by discounting non-energy

uses.

Table A.24. Primary energy consumption including non-energy uses in the PNIEC Scenario 2023-2030

Primary energy consumption including non-energy uses in the Scenario (ktoe)				
Years	2019	2020	2025	2030
Coal	5.072	3.100	1.470	952
Oil and its derivatives	56.162	45.690	47.809	37.616
Natural gas	30.897	27.915	21.084	17.989
Nuclear	15.218	15.174	14.653	9.164
Renewable	17.516	18.129	27.980	40.315
Industrial waste	270	304	347	404
RSU (non-renewable)	256	236	26	18
Electricity	590	282	— 978	— 2.497
Total	125.981	110.830	112.392	103.962

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The following are the main conclusions in this regard in the tables above:

- The primary energy consumption or CEP in 2030 is 98.449 ktoe applying the methodology of Directive 2023/1791.
- Consumption of petroleum products and natural gas in **2019** exceeds 69 % of the total. The policies and measures included in the Plan manage to reduce this dependence on hydrocarbons in the country's energy balance.
    - The impact of policies and measures to decarbonise the economy is reflected, as well as the significant introduction of renewable energy into the primary energy balance. The reduction in primary energy consumption in 2030 compared to 2019 is 17 %.
    - Renewable energy consumption more than doubled in 2030 compared to 2019.
    - Coal consumption is reduced to a fifth of that it was demanding in 2019, mainly due to the gradual closure of coal-fired power plants.
    - Consumption of petroleum products is reduced by 33 % compared to 2019; natural gas is also reduced by 42 %.
    - Energy consumption from nuclear technology is decreasing, accompanied by the planned, phased and orderly closure of the plants.

A.3.2 Final energy consumption

A Annulment, the projections for total final energy consumption are presented for each of the sectors included in the model: industry, residential, services, transport, agriculture and others.

Final energy consumption or CEF is defined according to Directive 2023/1791 as all energy supplied to industry, transport (including energy consumption in international aviation), households, public and private services, agriculture, forestry and fisheries and other end-user sectors, excluding energy consumption by international ships, environmental energy and supplies to the transformation and energy sector, and losses due to transmission and distribution as defined in Annex A to Regulation (EC) No[1099/2008].

Table A.25 shows the final energy consumption using the methodology of the Energy Efficiency Directory and including non-energy uses. The final energy consumption objection can be obtained by discounting non-energy uses.

Table A.25. Final energy consumption including non-energy uses in the PNIEC Scenario 2023-2030

Final energy consumption including non-energy uses in PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Coal	481	414	283	232
Petroleum Products	49.223	39.473	40.702	32.649
Natural gas	14.922	14.264	13.677	11.439
Electricity	20.166	18.887	20.758	23.543
Renewables	5.895	5.511	7.357	8.950
Other non-renewables	217	193	353	408
Total	90.905	78.742	83.130	77.222
Non-energy	5.352	5.804	4.917	5.513

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The main comments on final energy consumption are presented for Annulment:

- The final energy consumption or CEF in 2030 is 71.709 ktoe using the methodology of Directive 2023/1791.
- The PNIEC Scenario 2023-2030 shows a very significant decrease of around 34 % in the consumption of petroleum products. Due to all the measures proposed, the Spanish economy will become more efficient in 2030 and less dependent on oil.
    - Final energy consumption is reduced by around 15 % between 2019 and 2030, despite the fact that the economic path is always growing. This implies that the proposed measures will advance the decoupling between economic growth and energy consumption.
    - Electricity consumption increases by around 17 % given the increase in electrification of the economy as one of the decarbonisation vectors.
    - Final consumption of SAmado petroleum products for 2030 is down by 34 % compared to the actual data for 2019, while consumption of natural gas is reduced by around 23 %.
    - Renewable energy consumption increases by around 52 %.

In conclusion, the needs of the Spanish economy in 2030 will become more energy efficient.

Industrial Sector

The table below sets out the final energy consumption in the industrial sector.

Table A.26. Final energy consumption in the industrial sector (excluding non-energy uses) for PNIEC Scenario 2023-2030

Final energy consumption in the industrial sector (excluding non-energy uses) for PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Coal	307	265	226	189
Petroleum Products	2.909	2.473	1.794	1.262
Natural gas	8.601	8.047	8.151	6.793
Electricity	6.528	5.923	6.765	8.306
Renewables	1.870	1.707	2.239	2.902
Other non-renewables	212	189	347	404
Total	20.428	18.604	19.523	19.856

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

With regard to industry, the PNIEC Scenario 2023-2030 highlights the following:

- There is a decrease in final consumption of coal, petroleum products and natural gas, thus helping to reduce GHG emissions from the industrial sector.
- There is an increase in electricity and renewable energy consumption, which compensates for the reduction in the consumption of non-renewable sources as a result of an increase in the capacity of the sector, which is more efficient and associated with new demands for projects.

Residential

The table below sets out the final energy consumption in the residential sector.

Table A.27. Final energy consumption in the residential sector (excluding non-energy uses) for PNIEC Scenario 2023-2030

Final energy consumption in the residential sector (excluding non-energy uses) for PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Coal	65	46	0	0
Petroleum Products	2.398	2.456	1.483	494
Natural gas	3.457	3.474	3.305	2.953
Electricity	6.275	6.296	6.651	6.543
Renewables	2.088	2.105	2.281	2.619
Overall total	14.283	14.377	13.721	12.609

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A number of conclusions can be drawn from the data presented in the tables above. Fossil fuel consumption is reduced and coal is eliminated, while the contribution of renewable energies is increased.

Services and Other

The following tables agree on final energy consumption in the services sector and others.

Table A.28. Final energy consumption in the services and other sectors (excluding non-energy uses) for the PNIEC Scenario 2023-2030

Final energy consumption in services and other sectors (excluding non-energy uses) for PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Coal	74	84	15	0
Petroleum Products	1.285	1.153	1167	792
Natural gas	1.990	1.926	1.559	1.127
Electricity	6.552	5.929	6.141	6.498
Renewables	228	225	376	541
Other non-renewables	5	5	6	4
Total	10.133	9.322	9.264	8.963

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The main conclusions drawn from the services sector and others are efficiency gains as well as increased renewable energy consumption.

Transport

The following table conforms the final energy consumption in the transport sector.

Table A.29. Final energy consumption in the transport sector (excluding non-energy uses) for PNIEC Scenario 2023-2030

Final energy consumption in the transport sector (excluding non-energy uses) for PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Petroleum Products	35.623	25.735	29.644	23.508
Natural gas	213	210	130	94
Electricity	339	287	673	1614
Renewables	1.631	1.402	2.295	2.180
Total	37.806	27.635	32.743	27.397

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The main findings affecting final energy consumption in the transport sector are presented:

- Firstly, it highlights the decrease in final energy consumption caused by measures to increase vehicle efficiency, the introduction of new, more efficient vehicles and modal shift policies.
- There is also a significant decline in the consumption of petroleum products, which are generated by electricity.

Agriculture

The table below sets out the final energy consumption in the agriculture, livestock and fisheries sector.

Table A.30. Final energy consumption in the agricultural sector (excluding non-energy uses) for PNIEC Scenario 2023-2030

Final energy consumption in the agricultural sector (excluding non-energy uses) for PNIEC Scenario 2023-2030 (ktoe)				
Years	2019	2020	2025	2030
Petroleum Products	2.158	2.315	2.149	1.980
Natural gas	195	161	126	118
Electricity	472	452	527	581
Renewables	78	71	159	207
Total	2.903	2.999	2.962	2.886

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Electrification of the economy

There are various measures implemented in this Plan that contribute to the electrification of the economy. In a context where electricity generation Aene a high renewable contribution, electrification of the economy contributes to decarbonisation.

The electrification of final energy consumption (excluding non-energy uses and international aviation) is increasing sharply in the PNIEC Scenario 2023-2030, as a result of the measures implemented in this Plan. Based on the year 2019, the electrification indicator increases from 25 % to 35 %, improving the indicator by 42 %.

Sectoral and in accordance with the tables in Section A.3.2, the largest contribution to electrification of the PNIEC Scenario 2023-2030 compared to 2019 is in transport, with electricity consumption in the sector increasing by 376 % between the two years, although electrification is improved in all sectors.

A.3.3 Energy Intensity

The following table shows the energy intensity values for both primary and final energy for the scenario.

The reduction in primary energy consumption or CEP proposed in this NECP is equivalent to 1.8 % per year since 2019, which, linked to an expected increase in GDP over the same period of 1.1 %, will result in **an improvement in the primary energy intensity of the economy of 3.2 % per year until 2030. In**terms of final energy intensity, **the 1.6 % annual reduction in final energy consumption or CEF since 2019** with the projected GDP growth will result in a **reduction of 3.1 % per year in energy intensity $ca final**.

Table A.31. Primary and final energy intensities in the Scenario

Primary and final energy intensities (toe/MEUR base 2016)					
	Years	2019	2020	2025	2030
PNIEC scenario 2023 – 2030	Primary Energy Intensity	105	104	87	73
	Final Energy Intensity	76	74	64	54

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A.3.4 Sectoral Route Strategies and Sheets

In order to implement some of the measures of the NECP 2021-2030 and Law 7/2021 of 20 May on climate change and energy transition, and also in the light of the objections that have been established in the European Initial Papers and the evolution of the economy and the energy sector, various roadmaps and strategies have been defined for a number of specific areas of particular importance in the energy sector. In addition, these roadmaps are briefly described and their forecasts compared with the projections set out in this update of the NECP, which, in general, are far beyond the momentum of tools such as the PRTR and the PERTE, the progress made in the normaAva of implementation in these years, as well as the need to accelerate the energy transition in line with the increased ambition at European level to which Spain is strongly committed.

Renewable Hydrogen Route Sheet

The Government of Spain approved the Hydrogen **Roadmap in October 2020: a commitment to renewable hydrogen**[173], with forecasts for the production and consumption of renewable hydrogen in Spain for 2030 and 2050. To this end, the Roadmap itself defines a set of 60 regulatory and sectoral measures for the deployment of this energy carrier in Spain, forming, in definition, a country project through which Spain becomes a hydrogen producing power through the development of a national industry covering the entire value chain. This Roadmap is ready to boost the deployment of hydrogen generated from renewable energy sources.

In addition, green hydrogen is one of the solutions for the energy transition promoted by the Spanish Government's Transformation and Resilience Recovery Plan, and in parAcular through PERTE ERHA.

It highlights the challenges and opportunities for the full development of renewable hydrogen in Spain, providing a series of measures to boost investment action, building on the European consensus on the role this energy carrier should play in the context of the green recovery.

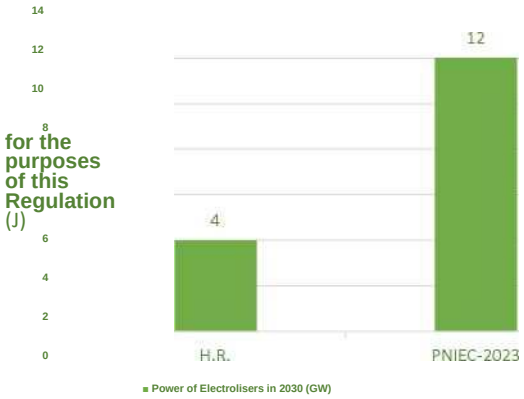
As a result of the boost to green hydrogen stemming from these tools, and given their significant potential to decarbonise some of the more diqcile sectors of abaAr, forecasts for the production of

173 Hydrogen Route Sheet: A commitment to renewable hydrogen

green hydrogen have increased, with 12 GW of electrolysers reaching GW of electrolysers in 2030. The figure below shows the comparison between the

installed capacity of electrolisation plants in the Roadmap for 2030 and the forecast of this NECP for the same year.

Figure A.1. Electrolyser power in 2 030 in the Renewable Hydrogen Roadmap and the NECP



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Energy Storage Strategy: co

The Aco Energy Storage Strategy174, adopted in February 2021, identifies the main challenges for the deployment of storage, the measures needed to develop it in the context of the creation of a new model of energy system, with the dual objective of climate neutrality and the exploitation of the opportunities that this change brings.

The development of storage is one of the key tools for giving flexibility to the electricity system, as well as for contributing to the gesAon of electricity grids, the promotion of citizens in changing the energy model and greater competition and integration in the electricity market. There is a wide variety of storage technologies with different applications and characteristics that are complementary, either because of their application in the electricity sector and their relationship with the electrification of the economy, or in the various end uses, such as thermal energy storage.

Electricity systems with high penetration of renewable energy. Some of the challenges associated with their integration need to be addressed. These include the use of verAdos and the provision of inertia of rolling Apo or synthetic Aca. To this end, there is a wide range of energy storage technologies, many of which already have a long distance and strong maturity.

The Fair and Inclusive Energy Transition Policy of the Recovery, Transformation and Resilience Plan includes among its objections the deployment of

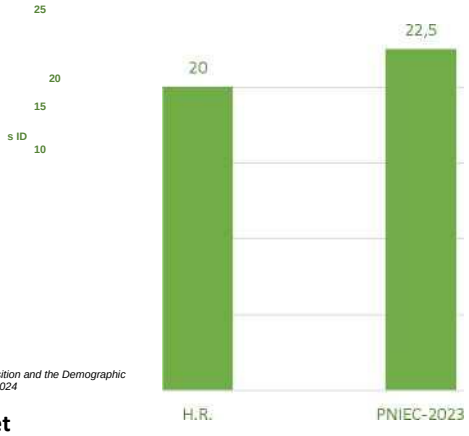
174MCO Energy Storage Strategy

storage technologies. Within this policy area, Component 8 should be highlighted: electricity infrastructure, promotion of smart grids and deployment of flexibility and storage, with EUR 1.365 billion, the main objective of which is to ensure the transformation of the energy system to make it flexible, robust and resilient so that it can be based primarily on renewable energy. To this end, the progressive adaptation of network infrastructures, their digitalisation and the deployment of flexibility tools, such as storage, to safeguard security and quality of supply will be promoted.

Component 8 has 4 reforms and 3 investments, all of which are directly or indirectly linked to the deployment of energy storage. In parAcular, investment 1. "Deployment of Aco Energy Storage" is worth EUR 684 billion. And investment 3 "New business models in the Aca Energy Transition" foresees to unlock EUR 156 billion in solutions that help to provide flexibility for the energy sector and increase innovation to address the challenges posed by the energy transition.

Given the boost to energy storage provided by tools such as the PRTR or the Normac developments that have taken place since the adoption of the Strategy, this updated NECP increases the Aco Energy Storage Clauses installed in 2030, exceeding the forecasts of the Strategy. The comparison between the two documents is shown below.

Figure A.2. Storage capacity in 2 030 in the Strategy and the NECP



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Biogas Route Sheet

The Spanish Government approved in March 2022 the **Biogas Roadmap**[175], which sets out a series of regulatory and sectoral measures, inter alia, for the deployment of this energy in Spain and which provides for a minimum production in 2030. This Roadmap focuses on biogas produced by anaerobic digesAon of disAntas residual raw materials from different origins, giving priority

175 Biogas Route Sheet

to their direct uAlisation on the basis of technical, environmental and economic criteria.

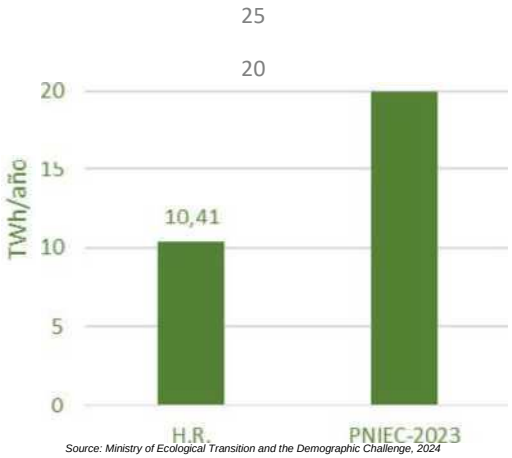
This Roadmap proposes to apply by 3,8 the production of this gas by 2030, exceeding 10.4 TWh. ConsAtuye the tool to guide and encourage the deployment and development of this biocombusAble in Spain, given its ability to integrate the circular economy into renewable energy generation.

Subsequently, the Communication of the European Commission (REPowerEU Plan) of 18 May 2022, with its objection of rapidly reducing the EU's dependence on Russian fossil fattles by accelerating the clean energy transition, highlighted the important role that biomethane can take biomethane as a proxy for fossil-based natural gas in this Senate and has set out an ambitious objection to biomethane production at 2030 of 35 bcm per year across the EU, accounting for approximately 8.5 % of annual natural gas demand in the EU.

As a result, and thanks to the strengthening of the measures in this Senate contained in the update of the NECP, the Roadmap's forecasts are considerably exceeded, doubling its calculations.

The figure below shows the comparison between the biogas production objection in the Roadmap for 2030 and the forecast of this NECP for the same year.

Figure A.3. Biogas production 2 030 in the Roadmap and the NECP



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Roadmap for the development of marine wind energy and marine energy

The Council of Ministers, on a proposal from the Ministry for the Ecological Transition and the Demographic Challenge, approved in December 2021 the Roadmap for the Development of Marine Wind and Marine Energy in Spain176.

This roadmap that boosts Spain's industrial leadership in renewable energy, taking advantage of the technological advance experienced over the years to generate stable, sustainable and quality jobs, sets a power of between 1 GW and 3 GW of floating wind in 2030, 40 % of the European target of having 7 GW installed from this renewable technology, and has an initial allocation to strengthen testing platforms and offer the best test beds for new technologies.

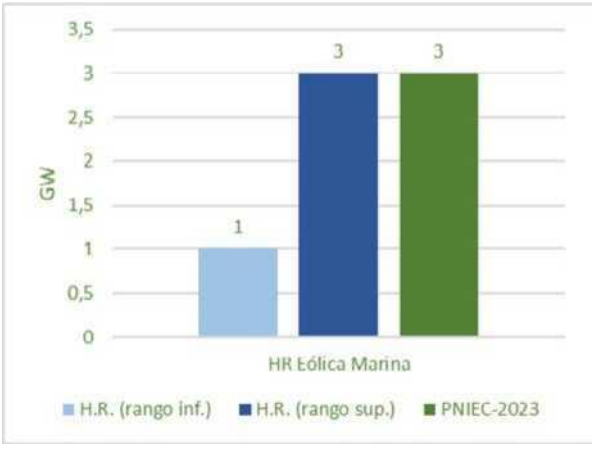
Within the PRTR, the PERTE for the shipbuilding industry has been developed, which supports the objections to the introduction of this energy source.

The figure below shows the comparison between the installed capacity according to the Roadmap

Road176 Sheet for the Development of Marine Wind and Marine Energy in Spain

for 2030, which is in the range of 1 to 3 GW, and the forecast of this NECP for the same year, which is at the upper limit of the range indicated.

Figure A.4. Offshore wind power in 2 030 in the Roadmap and the NECP



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

The Self-Consumption Roadmap

The Self-Consumption Roadmap177, approved in 2021, sets out the political issues supporting and promoting this method. It sets a potential of 9 GW by 2030, with a 'high penetration' scenario reaching 14 GW in 2030. However, the set of measures taken and the demand from citizens, businesses and public administrations has so far facilitated faster penetration than expected. Since 2018, self-consumption in Spain has been multi-applied, reaching a cumulative total of between 2.500 MW and 2.750 MW in 2021 according to the main sectoral associations. An increase of approximately 2.500 MW is estimated for 2022, bringing the cumulative total to around 5.200 MW.

The Aene Roadmap as the main moAvation idenTo identify challenges and opportunities and set out measures to meet the development potential of the sector and sets out the following Objectives:

- Establish the penetration potential of self-consumption by consumer Apo.
- Establish lines of action to promote renewable self-consumption, placing citizens at the centre of the Aco energy system, and use them as a key tool in the fight against energy poverty.
- Develop tools to promote their comparative use.
- Facilitate the deployment of applications in areas such as industrial or service sectors in a context of economic reactiveness, as well as in the public sector.
- Develop self-consumption as a lever for the rapid generation of aviation and employment, both directly and through the effect on local value chains and savings in energy costs for consumers and industry

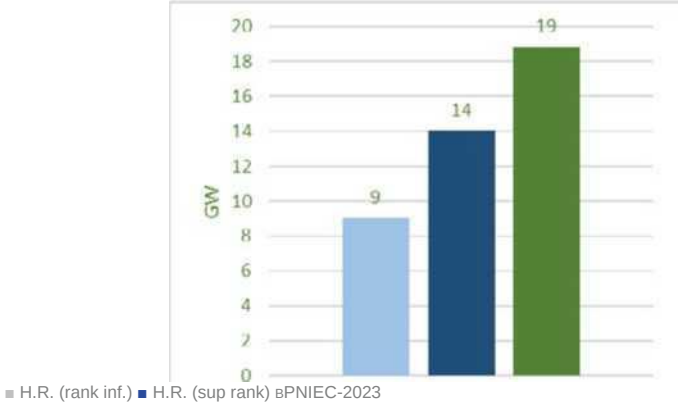
The Roadmap is included in Reform C7 R2 'National Self-Consumption Strategy' of Component 7 'Deployment and Integration of Renewable Energy' of the PRTR into the Palanca 3 polyAca. "Just and Inclusive Energy Transition". In fact, the PRTR has dedicated its main aid instrument in the field

Self-consumption177 Route Sheet

of energy transition to self-consumption, with a budget of more than EUR 1.800 million. This push plan has been key, in times of uncertainty such as those associated with the COVID-19 crisis and Russia's invasion of Ukraine, to maintain and accelerate the deployment of self-consumption in Spain.

The figure below shows the comparison between the forecast of self-consumption power in the Roadmap for 2030 and that of this NECP for the same year, which far exceeds the value of the higher range indicated.

Figure A.5. Self-consumption capacity in 2 030 in the Roadmap and the NECP



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A.4 DIMENSION OF ENERGY SECURITY

This section analyses the impact of the country's primary energy balance on security of energy supply. The consumption of hydrocarbons (oil and natural gas) in primary energy accounts for approximately 66 % of the total currently. For this moAvo, and considering that domestic hydrocarbon production is residual, the supply of this combusAbles Apo is essential for the country's energy security, which is understood as security of supply.

In order to reduce exposure to the risks that the reduction in the supply of these combusAbles could represent, two routes have been followed which are complementary to the other Objectives of this Plan:

- Firstly, an increase in the country's energy efficiency will reduce total energy demand, which will require less energy capacity for saAsfacerla.
- Secondly, and in order to increase the effect of the above, in the2030 PNIEC Scenario, there is a significant suspicion of fossil fuels by other indigenous sources (almost all renewable energy sources).

These two effects have been seen in the previous sections detailing the primary and final energy consumption of the Spanish economy.

In addition, this section also analyses the external dependence of the electricity generation sector. This sector is also dependent on hydrocarbon consumption, although to a lesser extent than the rest of the economy.

A.4.1 Current energy balance, energy resources and import dependency

In the previous sections, we have presented the various primary sources that set out the origin of the energy supply to Spain, as well as the breakdown and its projection for the future. Based on these observations, the following observations can be made with regard to security of supply:

- The presence of natural gas in the Spanish energy balance is slightly lower than in other EU Member States, which can be explained, inter alia, by the following movists:
  - More benign climate, resulting in reduced penetration of natural gas among consumers
  - Increased importance of natural gas in electricity generation, which suggests that its presence in final energy is significantly lower than the share of primary energy
- As regards petroleum products, their presence in the national energy mix is higher than the EU average. This can be explained by the following reasons:
  - Elevant development of road freight transport
  - Important consumption for maritime transport vs. inland Member States
  - Alevant consumption for air transport due to the importance of the tourism sector

Aco

The national production of hydrocarbons is practically practically tesAmonial, with the data for 2023 being as follows:

- **Domestic production of natural gas (2023):** 540.5 GWh (0.16 % of total needs). Domestic production is not only the production of hydrocarbon deposits, but also the injection of biogas into the transport network.
- **Domestic crude production (2023):** 672 tonnes (0.001 % of total needs)

The main countries of origin for the various sources of energy are the following:

- **Electricity:** Spain has electricity interconnections with France, Portugal, Andorra and Morocco. Details of imports and exports with these countries can be found in the table below.

Table A.32. Annual international trade by border

Annual physical international trade by border (GWh)									
	Years	2010	2015	2017	2019	2021	2022	2023	2024 **
Tickets	Andorra	0	0	0	0	0	0	0	0
	France	1.983	9.131	15.564	12.813	11.931	4.549	7.432	2.653
	Portugal	3.189	5.811	8.190	4.700	4.792	3.060	3.425	3.162
	Morocco	34	14	8	1.208	688	423	459	158
	Total	5.206	14.956	23.763	18.721	17.411	8.032	11.316	5.974
Departures	Andorra	264	264	233	208	225	286	241	123
	France	3.514	1.807	3.099	3.116	6.281	13.380	9.063	5.210
	Portugal	5.823	8.077	5.505	8.099	9.543	12.315	13.654	4.167
	Morocco	3.937	4.941	5.756	435	509	1853	2.315	1.101
	Total	13.539	15.089	14.594	11.859	16.559	27.833	25.273	10.600
Balance178	Andorra	— 264	— 264	— 233	— 208	— 225	— 286	— 241	— 122
	France	— 1.531	7.324	12.465	9.697	5.650	— 8.831	— 1.630	— 2.556

178Position1vo: import balance; Negative value1vo: export balance.

Portugal	— 2.634	— 2.266	2.685	— 3.399	— 4.752	— 9.256	— 10.230	— 1.005
Morocco	— 3.903	— 4.927	— 5.748	773	179	— 1.430	— 1.856	— 942
Total	— 8.333	— 133	9.169	6.862	852	— 19.802	— 13.957	— 4.626

- Russia (18 %)
- Nigeria (14 %)
- Catar (4 %)
- France (4 %)
- Others (10 %)

- **Petroleum products:** as regards crude oil imports, the main countries of origin in 2023 were:
  - United States (14 %)
  - Mexico (11 %)
  - Brazil (11 %)
  - Nigeria (10 %)
  - Libya (7 %)
  - Angola (7 %)
  - Others (40 %)

As can be seen, diversification in oil sources is much higher than that of gas.

A.4.2 Development plans for the energy balance, energy resources and dependence on imports with existing policies and measures

In addition, the projection for 2030 of the breakdown of primary energy by national production and imports is presented.

Table A.33. Evolution of the primary energy dependency of the Scenario (ktoe)

Source of Primary Energy, PNIEC Scenario 2023-2030 (ktoe)					
	Years	2019	2020	2025	2030
Indigenous production		33.823	34.458	43.762	51.588
		27 %	31 %	39 %	50 %
Coal		0	0	0	0
Petroleum Products		40	28	147	148
Natural gas		116	42	49	49
Nuclear		15.218	15.174	14.653	9.164
Renewables		17.922	18.674	28.539	41.805
Non-renewable waste		526	540	373	422

Source: Red Eléctrica de España

- **Natural gas:** in 2023, 30 % of imports were made via pipeline, compared to 70 % by methane vessels, in the form of liquefied natural gas (LNG) to regasification plants.

  The breakdown by country of origin of natural gas imports in 2023 was as follows:
  - Algeria (29 %)
  - United States (21 %)

Net	92.159	76.372	68.630	52.373
imported/exported	73 %	69 %	61 %	50 %
Coal	5.072	3.100	1.470	952
Petroleum Products	56.122	45.661	47.662	37.468
Natural gas	30.781	27.874	21.035	17.940
Electricity	590	282	— 978	— 2.497
Renewables	— 406	— 545	— 559	— 1.489
Total Primary Energy	125.981	110.830	112.392	103.962

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Compared with the situation in 2019, where the external energy dependency ratio is 73 %, the PNIEC Scenario 2023-2030 provides for a reduction of 23 percentage points, reaching 51 %. This will further reduce one of the most important structural weaknesses of the national energy system.

In addition, the import of fossil fuels is reduced by an even higher percentage than energy dependence. This effect is achieved by the combination of the two effects discussed at the beginning of this section: the reduction in overall energy consumption through the use of energy efficiency, as well as the raising of hydrocarbon consumption by indigenous combusAbles (especially renewable energies and largely thanks to increased electrification of the sectors).

With all of the above, the trade balance is projected to improve substantially by 2030, subject to compliance with the policies and measures included in the Plan. Specifically, from a net import of 91.975 ktoe between coal, natural gas and oil in 2019, to 56.359 ktoe in 2030 (39 % reduction).

With regard to electricity, the increase in installed capacity of renewable energy sources increases security of supply due to the use of indigenous sources and increased diversification of sources. The PNIEC Scenario 2023-2030 achieves 81 % of electricity generated from renewable sources. As regards their relationship with security of supply, it is worth noting the increase in interconnections with France. This increase is planned to progressively move closer to the EU objections of interconnection capacity of at least 15 % of each Member State's installed capacity. This point is discussed in more detail in section A.5.

A.4.3 Cybersecurity

The definition of the cybersecurity objection is: "*ensure secure use of communication and information systems and networks by strengthening capacities to prevent, detect and respond to cyber-attacks by enhancing and taking specific measures to contribute to the promotion of a safe and reliable cyberspace.*"

According to the Annual National Security Report 2021, most attacks come from the injection of harmful souwares, impersonation and deception and take advantage of the unsafe practices of citizens and employees (not used to protect the information they handle). Ransomware remains the biggest threat to systems and information. During the first part of the year, various ransomware cyberattacks had a significant impact on some public bodies.

An important step in the area of cybersecurity in Spain was the reform of the Criminal Code that took place in 2015, in which significant changes were made to the offences related to informational sabotage, in compliance with Directive 2013/40/EU of the European Parliament and of the Council of 12 August 2013 on attacks against information systems and creating Council Framework Decision 2005/222/JAI.

A sector of strategic importance for national security is the sector of Critical **Infrastructure $. The existence of NormaAva for the Protection of Critical Infrastructures in Spain since 2011 has also**made it possible to transpose Directive 2016/1148 of the European Parliament and of the Council of 6 July 2016 on measures aimed at achieving a high common level of security of the Union's network and information systems (Direc**$va NIS**), in a rapid and simple manner, since the same procedures and accumulated knowledge have been used to implement this implementation. The entry into force of **Royal Decree-Law 12/2018 of 7 September 2003 on the security of network and information systems,** as developed in Royal Decree 43/2001 of 26 January 2015, transposed into Spanish law the aforementioned NIS Directive, which has given a significant boost to the cybersecurity of essential services in the field of energy.

In addition to this normaAva update, in April 2019 Spain adopted its **National Cybersecurity Strategy**, whose role is to develop the forecasts of the 2017 National Security Strategy in the field of cybersecurity, and which has been endorsed by the previous one, approved in 2013. Subsequently, fulfilling the mandate issued by the National Security Council and developing the above-mentioned National Cybersecurity Strategy 2019, the National Cybersecurity Plan was approved in March 2022. It should also be noted that since 2015 Spain has had a National Energé $Security **Strategy. In**view of the major normaAvos, technological and energy policy changes that have taken place in these years, it is expected to be updated shortly.

This strategy has enhanced and strengthened public-private partnerships with the various energy operators, which has been coordinated by the Coordination and Cybersecurity Office (OCC) of the Ministry of the Interior. Likewise, the designated operators in the field of energy and the nuclear industry have submitted their respective Operator Safety Plans (OSP), checking that they are in line with the current situation of threats and disorder to which the critical infrastructure in the energy sector and the nuclear industry is exposed, updating the information contained in these plans.

Finally, Spain has taken good note **of the Commission Recommendation** to the Member States on Cybersecurity in the Aco Energy Sector of 3 April 2019 and will systematically implement the recommendations on the actual requirements of energy infrastructure, on cascading effects and on the appropriate combination of less recent and current technologies (*the Jon of legacy and state-of-the-art technology).*

A.5 INTERNAL ENERGY MARKET

This dimension analyses the various components that make up the internal energy market. The importance of interconnection, energy transmission infrastructure and integration of the Aco energy market is highlighted.

The two markets referred to in this paragraph are electricity and gas. International exchanges on the electricity market are carried out through interconnections between countries. On the other hand, international gas exchanges take place via pipeline or through the use of vessels transporting liquefied natural gas. These international exchanges are key to progressing towards a unified European energy market.

A.5.1 Interconnectedness

A.5.1.1 Interconnectedness of the electrical system

Current level of interconnection and main interconnections

Spain is currently electrically interconnected with the Member States of Portugal and France, as well as with Andorra and Morocco, which are not members of the EU.

The main characteristics of the interconnections with the above mentioned countries are presented:

- The **interconnection with France** consists of 5 lines: Hernani-Argia 400 kV, Arkale-Argia 220 kV, Biescas-Pragnères 220 kV, Vic-Baixas 400 kV and Santa Llogaia-Baixas 400 kV.

  The Santa Llogaia-Baixas line is connua current and was put into service in October 2015 through the Eastern Pyrenees. It is of great importance, as it allowed to double the electricity exchange capacity with this country, reaching a total of around 2.200-2.800 MW. It is also important because of its influence on quality and security of supply and the capacity to integrate renewable energy. Despite this line, the need to increase Spain's interconnection capacity with the European system remains a priority for the Spanish electricity system.
  In order to increase this interconnection capacity with France, the Electricity Transport Network Development Plan 2021-2026 provides for the construction or reinforcement of the following electricity links:
  - Spain-France Interconnection for the Gulf of Bizkaia: Submarine interconnection of connua current, with VSC technology of almost 400 km length, with a transmission capacity of 2x1.000 MW between the GaAca substation (near Bilbao) and the Cubnezais substation (in the French region of Aquitaine), which was declared a Project of Common Interest (PCI) in 2013
  - Reinforcing Spain-France interconnection (GaAca): Internal reinforcements associated with the future underwater interconnection between Spain and France over the Bay of Biscay: Repowering of lines GaAca-Güeñes 400 kV, GaAca-AzpeiAa 400 kV, GaAca – Amorebieta and Amorebieta-Itxaso 400 kV, new transformer at GaAca 400/220 kV
  - Strengthening interconnection between Spain and France (Hernani-Argia): Renewal with driver change of the current section Hernani – French border 400 kV of the Hernani-Argia line

With these actions, exchange capacity will increase to 5.000 MW.

- The **interconnection with Portugal** is built on 11 lines: Cartelle-Lindoso 400 kV 1 and 2, Conchas-Lindoso 132 kV, Aldeadavila-Lagoaça 400 kV, Aldeadavila-Pocinho 1 and 2 220 kV, Saucelle-Pocinho 220 kV, Cedillo-Falagueira 400 kV, Badajoz-Alcáçovas 66 kV, Brovales-Alqueva 400 kV, Rosal de la Frontera-V.Ficalho 15 kV and Puebla de Guzmán- Tavira 400 kV. These lines amount to a total exchange capacity of between 2.200 and 3.000 MW.

  On the other hand, it is planned to increase this capacity through the construction of a new 400 kV line by Galicia between Fontefría (Spain) and Vilafría (Portugal).

- The **interconnection with Andorra** is carried out with the Adrall-Margin 110 kV line.

  The 2021-2026 Electricity Transport Network Development Plan provides for the construction of a new interconnection between Spain and Andorra, in order to increase the exchange capacity with the Andorra system and thus be able to feed the demands expected in that system from the Spanish system. This project consists of the entrustment of the existing 110 kV line by a new double circuit of 220 kV from Adrall to the border with

Andorra.

- Finally, **the interconnection with Morocco** takes place through 2 submarine lines of 400 kV, which in total provide an exchange capacity of around 800 MW.

  The 2021-2026 Electricity Transmission Network Development Plan provides for the construction of a third axis of 400 kV between Spain and Morocco accompanied by a new submarine link between Puerto de la Cruz 400 kV and Beni Harchane 400 kV (Morocco) and 4 reactances of 50 MVAr at Puerto de la Cruz 400 kV and with a power of 700 MVA.

Commercial exchange capacity and $or electricity interconnection capacity

The total effective exchange capacity between two countries depends not only on the nominal capacities of the lines crossing the border but also on the related network, on the distribution of electricity flows with the other interconnections and on the location of the generation centres and consumption points. For this moAvo, the sum of the nominal capacities of the lines crossing the border may be significantly lower than the total effective capacity.

In addition, the exchange capacity values of the Spanish mainland system with France and Portugal for the period from 2013 to 2023 are shown, according to the information provided by the system operator.

The values of exchange capacity available to the system operator are considered and two values are given, one with percenAl 70179 (in line with ENTSO-E180) and the other with the maximum value (it makes it possible to see more clearly the increase in interconnection capacity in the same year of improvement).

Table A.34. Commercial electricity exchange capacity

Year	NTC France ♦☐ Spain (MW)		NTC Portugal ♦☐ Spain (MW)	
	70th percentile	Maximum value	70th percentile	Maximum value
2013	1.200	1.300	2.000	2.400
2014	1.200	1.300	2.100	2.900
2015	1.300	2.950	3.000	4.000
2016	2.750	3.500	2.800	3.900
2017	2.850	3.500	3.200	4.000
2018	2.800	3.600	3.450	4.000
2019	2.400	3.600	3.600	4.300
2020	2.913	3.746	3.240	4.545
2021	3.237	3.838	3.375	1.500
2022	3.145	3.838	3.240	4.590
2023	2.682	3.885	3.150	4.599

Source: Red Eléctrica de España

The values of the interconnection ratios presented below have been calculated by applying the

179**PercenMl 70 is the value commonly used to determine the exchange capacity of international interconnections. This percenMl is used to leave a certain safety margin**

180**ENTSO-E is the European Network of Transmission System Operators for Electricity and represents 43 Technical System Operators (TSOs) from 36 European countries.**

following additional considerations assumed by REE and based on those defined by ENTSO-E:

- For the calculation of the raAo of the Spanish mainland system, the borders with France and Portugal are taken into account. It is not considered Morocco as it is not subject to obligations and commitments at European level.
- For the calculation of the Iberian Peninsula raAo, only the France-Spain border is taken into account.
- For the purposes of calculating the numerator, the sum of the import capacities from Spain for the period considered is taken into account. Import capacity values are derived from the *Net Transfer Capacity* (NTC) hourly values published in eSIOS[181].
- The installed capacity value is the one corresponding to the start of the period considered.

[181] eSIOS is the Spanish System Operator Information System (REE)

Table A.35. Evolution of installed electricity generation power Spain-Portugal

Year	Installed capacity Spanish mainland system[182] (MW)	Installed capacity Portuguese system (MW)
2013	102.378	18.494
2014	102.908	17.792
2015	102.827	17.776
2016	103.287	18.563
2017	102.371	19.518
2018[11]	101.207	19.800
2019	103.205	20.161
2020	109.674	20.388
2021	112.816	19.552
2022	117.558	20.656
2023	124.234	21.241

Source: Red Eléctrica de España

Table A.36. Electricity Interconnection Roundtable

Year	electric	Ratio of interconnection 70th percentile	Maximum	Observations
2013	Spain	3.1 %	3.6 %	
	Iberian Peninsula	*1.0 %*	*1.1 %*	
2014	Spain	3.2 %	4.1 %	May 2014: Commissioning of the Southern Spain-Portugal interconnection (Puebla de Guzmán — Tavira)
	Iberian Peninsula	*1.0 %*	*1.1 %*	
2015	Spain	4.2 %	6.8 %	June 2015: Entry into service of the Spain-France interconnection via Catalonia (Santa Llogaia — Baixas)
	Iberian Peninsula	*1.1 %*	*2.5 %*	
2016	Spain	5.4 %	7.2 %	
	Iberian Peninsula	*2.3 %*	*2.9 %*	
2017	Spain	5.9 %	7.3 %	
	Iberian Peninsula	2.4 %	2.9 %	
2018	Spain	6.2 %	7.5 %	
	Iberian Peninsula	2.3 %	3.0 %	
2019	Spain	5.8 %	7.7 %	
	Iberian Peninsula	2.0 %	3.0 %	
	Spain	5.6 %	7.6 %	

182 Includes the installed capacity in the Balearic system at the end of the commissioning of the Peninsula – Mallorca link

2020	*Iberian Peninsula*	2.2 %	2.9 %
	Spain	5.9 %	7.4 %
2021	*Iberian Peninsula*	2.5 %	2.9 %
	Spain	5.4 %	7.2 %
2022	*Iberian Peninsula*	2.3 %	2.8 %
	Spain	4.7 %	6.8 %
2023[183]	*Iberian Peninsula*	1,9I%	2.7 %

Source: Red Eléctrica de España

Projections of interconnection expansion requirements

By Agreement of the Council of Ministers of 22 March 2022, the 'Aca Energy Planning' document was approved. Plan for the Development of the Electricity Transmission Network 2021-2026', provided for in Article 4 of Law 24/2013 of 26 December on the Electricity Sector and published by the Resolution of 8 April 2022 of the State Secretariat for Energy. This planning commands and reinforces the approaches already present in the 2015-2020 planning set out in the document "Energy Planning Aca. Electricity Transmission Network Development Plan 2015-2020', approved by the Council of Ministers on 16 October 2015.

The 2021-2026 Planning includes a new 400 kV line via Galicia, called Fontefría-Vilafría, for the reinforcement of the Spain – Portugal **interconnection. This**new link, which is expected to be operational in 2024, will increase exchange capacity with Portugal, reaching values of 4.200 MW from Spain to Portugal and 3.500 MW from Portugal to Spain. Its launch will contribute to the green transition process in Spain, facilitating further integration of renewable generation. In particular, once Ava permiArá is operating, up to an additional 293 GWh/years, which accounts for approximately 3 % of the current annual wind production in Galicia, will allow the emission of 150 kilotonnes of CO_2eq per year to be avoided, as well as cost savings of up to EUR 22 million/year.

In addition, in order to improve the **Spain-France interconnection**, the construction of a submarine interconnection between Spain and France on connua current, with VSC technology and made up of two symmetric monopoles of 400 kV and 1 000 MW each, has been included inthe 2026 horizon. It is a key element enabling the integration of the mainland electricity system into the European single market, helping to integrate existing renewable energy in Europe and especially in Spain and the Iberian Peninsula and improving its level of interconnection in order to meet the objectives set by the EU. In addition, in order to cater for the increase in flows to and from France, it is envisaged that the interconnection of GaAca and Hernani-Argia with France will be strengthened.

In addition to the infrastructure needed for the period 2021-2026, which would include binding planning, the planning document 2021-2026 idenAfica a series of actions which, although necessary and beneficial within the planning horizon to 2026, are not feasible for constructional or economic reasons.

Annex Horizon Actions after 2026 contains a list of these actions, which are proposed, **as $vo**, with a date of commissioning after 2026:

- Spain – France interconnection between Navarra and Landes: new interconnection between Spain and France for the western Pyrenees between the Olza region in Spain and Cantegrit in France. This new interconnection will be in connua current, with VSC technology and made up of two 1 000 MW symmetric monopoles each.

183**Data until 15 December 2023**

- Spain – France interconnection between Aragon and Pyrenees AtlánAcos: new interconnection between Spain and France via the central Pyrenees area between the region of Aragon in Spain and Marsillon in France. This interconnection shall be connua current with VSC technology and shall consist of two symmetric monopoles of 1 000 MW each.

In December 2023, the procedure for developing a new electricity transmission network planning for 2030, Planning 2025-2030, was launched, which will include interconnections that have not yet been put into service. It is hoped that this planning for 2030 will be approved by the end of 2025.

The Infrastructure Package was adopted in 2013 and Regulation (EU) No 347/2013 laid down the requirements and procedures for the idenAfication of the so-called Projects of Common European Interest (PCIs). Subsequently, the revision of the Regulation on trans-European energy networks (EU) 2022/869 was adopted in June 2022, repealing the previous regulation.

So far, six lists of PCIs have been published. This list (first list of projects of common interest and of mutual interest PCI/PMI), which was approved by the Commission on 28 November 2023, comprises 166 PICS which includes 68 electricity projects (transmission and storage), 12 offshore networks, 65 hydrogen and electrolysers, 5 smart electricity grids and 14 cross-border carbon dioxide grid projects.

For Spain, PCIs for electricity and storage are included in Group 1 of the "Priority Corridor North-South Electricity Interconnections in Western Europe (NSI West Electricity)". The PCIs included in Group 1 affecting our country are:

- Interconnection between Aquitaine (FR) and Basque Country (ES) (Gulf of Bizkaia project).
- Interconnection between Aragon (ES) and Pyrenees AtlánAcos (FR).
- Interconnection between Navarra (ES) and Landas (FR).
- Portugal – Spain interconnection between Beariz – Fontefría (ES), Fontefria (ES) – Ponte de Lima (PT) and Ponte de Lima – Vila Nova de Famalicão (PT), including substations in Beariz (ES), Fontefría (ES) and Ponte de Lima (PT).

These PCIs allow an increase in interconnection capacity with France to 8.000 MW.

As far as storage is concerned, the PCIs included in this cluster 1 are:

- Hydro-pumped electricity storage in Navaleo (ES).
- Reversible pumped hydropower storage The GUAJARES (ES).
- Pumped reversible pumped storage Aguayo II (ES).

Strengthening international interconnections between Spain and France is essential in order to boost the energy transition of the Spanish mainland electricity system, as well as to enable it to work together to achieve the objectives of integrating renewables and decarbonising the European Union, by advancing the integration of the Spanish mainland electricity system into the Internal Energy Market.

The system operator conforms Anúa GesTo the projects of these future interconnections. The consultation and public participation phase of the interconnection through the Bay of Biscay, which is the most advanced phase, was closed in March 2018. In 2022, the second phase of public information began, including the list of affected goods and rights.

Similarly, the 2021-2026 Planning includes a new Spain-Andorra interconnection via 220 kV overhead line, dual circuit between the Adrall substation and the Andorra border.

The commissioning of the underwater interconnection with France through the Bay of Biscay will lead to an interconnection with the rest of Europe of 5.000 MW. Once transpyrenaic projects have been commissioned, it would reach 8.000 MW. It is important to note that, despite this significant increase in interconnection capacity, the European interconnection objections would not yet be met.

A.5.1.2 Interconnectedness of the gas system: Current level of interconnection and main interconnections

Spain currently has 6 interconnections, 4 with EU Member States and 2 with third countries.

Interconnections with France

There are two qsicas interconnections with France, via the municipalities of Irún (Guipúzcoa) and Larrau (Navarra). Both are gesAonan as a single interconnection or virtual point (Pirineos VIP). Transport capacities are as follows:

- France-Spain Senate: 165 GWh/firm day + 65 GWh/day interruptible.
- Spain-France Senate: 225 GWh/day.

During 2017, net imports via this interconnection amounted to 43 TWh, representing a daily net flow of 121 GWh/day in the North-South Senate, albeit with a marked seasonality. Therefore, the usual flow is France-Spain, although it can sometimes revert Arse.

It should be recalled that the interconnection capacity of Spain and, as a whole, of the Iberian Peninsula is among the smallest in the EU. In 2017, peak demand was recorded on 5 December, at 1.772 GWh/day. During that particular day, firm interconnection capacity with France could contribute only 9 % of demand, which could amount to up to 13 % in view of interruptible capacity.

Interconnections with Portugal

There are two qsicas interconnections with Portugal, via the municipalities of Badajoz and Tuy (Pontevedra). Like the interconnection with France, both are gesAonan as a single interconnection or virtual point (Iberian VIP). Transport capacities are as follows:

- Portugal-Spain Senate: 80 GWh/day.
- Spain-Portugal Senate: 144 GWh/day.

During 2017, net exports via this interconnection amounted to 30 TWh, resulting in a daily net flow of 82 GWh/day.

Interconnections with Algeria

There are two quantitative interconnections with Algeria, both unidirectional in Senate import:

- The Magreb-Europe pipeline, which crosses Morocco and enters Spain via the municipality of Tarifa (Cádiz), with a transport capacity of 444 GWh/day.

  During 2017, imports via this interconnection amounted to 86 TWh, resulting in a daily net flow of 237 GWh/day.

- The Medgaz pipeline, which enters Spain via the municipality of Almería, with a transport capacity of 290 GWh/day, which could be increased by an additional 25 % with investments

in Algerian territory.

During 2017, imports via this interconnection amounted to 75 TWh, resulting in a daily net flow of 205 GWh/day.

A.5.1.3 New hydrogen infrastructure: ICP projects

Spanish hydrogen infrastructure PCIs are included in the Western Europe Hydrogen Interconnections (HI West) Group. The PCIs included in this group affecting our country are:

- Corridor Portugal – Spain – France – Germany: this includes the following infrastructures which will be implemented on Spanish territory:
  - Hydrogen Interconnector Portugal – Spain ('CelZa' project): Ará allows up to 0.75 Mt/year of renewable hydrogen to be imported from Portugal to Spain by 2030.
  - Internal hydrogen infrastructure in Spain: it will involve the construction of four axles with a total length of approximately 3.000 km by 2030.
  - Hydrogen Interconnector Spain – France (currently known as "BarMar"): allow exports to France, and thus to the rest of Europe, of up to 2 Mt/year of renewable hydrogen from each to 2030.
- Electrolyser facilities in Spain:
  - electrolyser of Tarragona hydrogen network
  - or Large-Scale Electrolyser in Bilbao
  - Large scale electrolyser from Cartagena
  - 'Valle Andaluz del Hydrogen Verde' electrolyser
  - Electrolyser "Asturias H2 Valley"
- Hydrogen storages in Spain:
  - or "H2 storage North – 1"
  - or "H2 storage North – 2"

  Both projects allow for an underground renewable hydrogen storage capacity in 2030 of around 575 GWh.

All these projects included in the list of Projects of Common European Interest will contribute to the further development of the hydrogen market by contributing to the supply of renewable hydrogen to the whole of Europe.

A.5.2 Energy transport infrastructure

A.5.2.1 Electricity transmission infrastructure

Key characteristics $of existing electricity transmission infrastructure

According to the information provided by REE in the 2023 Electricity System Report, the electricity transmission network was upgraded in 2023 with the commissioning of 157 km of circuit and 143 substation positions, bringing the total circuit length of the national transmission network to

45.223 kilometres, with an increase of 0.4 % compared to 2022. On the other hand, processing capacity increased by 760 MVA, bringing the total domestic processing capacity to 94.981 MVA (0.8 % higher compared to 2022).

The breakdown of the lines of the transmission network and considering their distribution between the mainland and island systems or non-mainland territories is presented for annulment.

Table A.37. Transmission system installations in Spain

	Peritatila	Peninsula	Bateares	Canaries	Total
Total Unea« (Mη)	22.937	19.330	2.903	1Л23	4X223
Lineas aaraas (km)	21.94«	19710	1.142	12ββ	43 M«
Cable submarino (km)	29	236	636	45	945
Cable subterráneo (km)	86	564	227	3'6	1JI?
TRAN Continue ion (MVAI)	3X013	1.333	34139	4.103	94,901

Source: Red Eléctrica de España184

184**Information compiled with data as of 31 December 2022**

Figure A.6. Evolution of the length of the transmission network

Source: Red Eléctrica de España

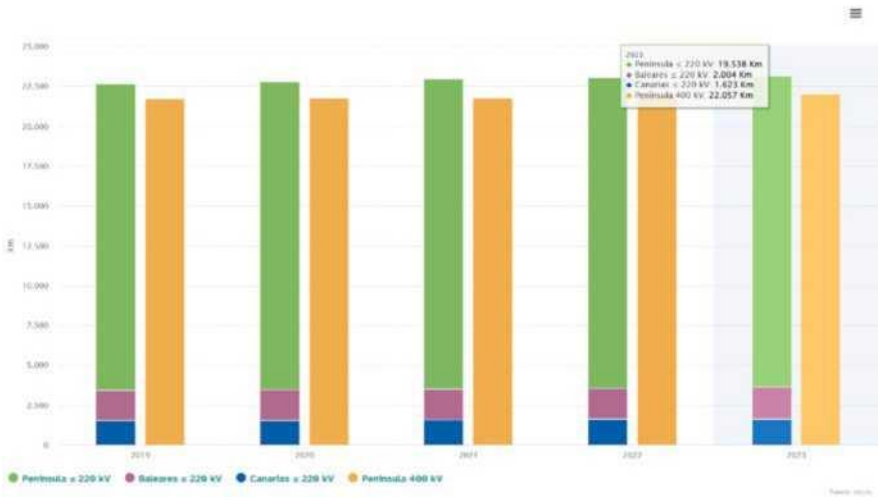
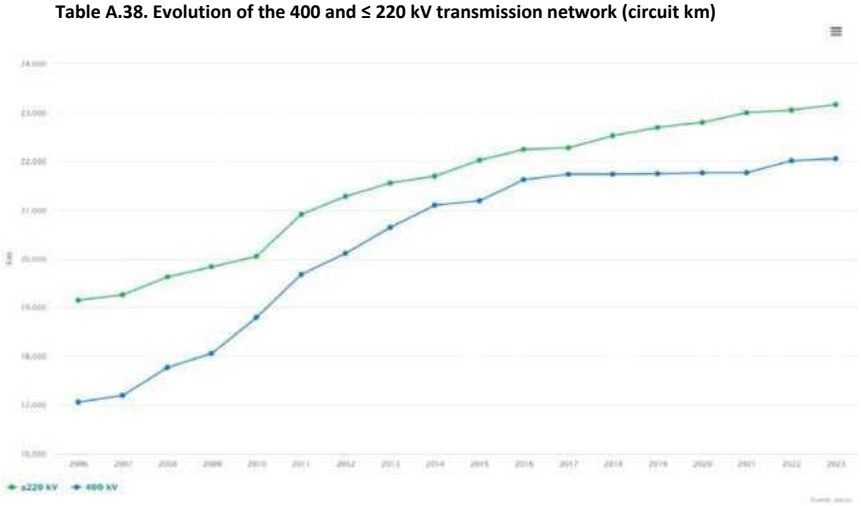


Table A.38. Evolution of the 400 and ≤ 220 kV transmission network (circuit km)



Source: Red Eléctrica de España

A.5.2.2 Gas transmission infrastructure

Key characteristics $of existing gas transmission infrastructure

Spain has a gas transmission network with sufficient capacity to meet the needs for supply and delivery to the distribution network in the medium term.

Figure A.7. Map of gas infrastructure as at December 2022

Source: Sedigas

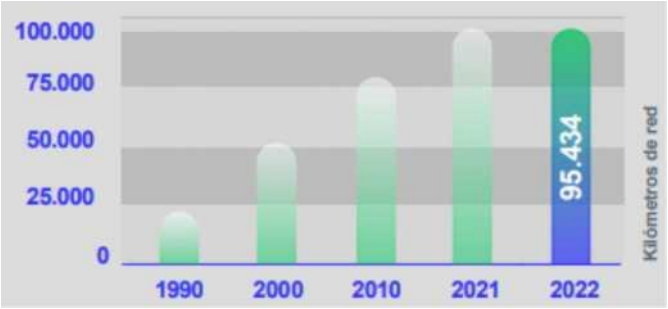
Pipeline network

The following definitions have been laid down in Law 34/1998 of 7 October 1992 on the hydrocarbons sector:

- Primary transmission pipelines for high-pressure natural gas: those having a maximum design pressure of 60 bar or more.
- Secondary transmission pipelines: those having a maximum design pressure between 60 and 16 bar.
- Distribution pipelines: those with a maximum design pressure of 16 bar or less, and others which, irrespective of their maximum design pressure, are intended to drive the gas to a single consumer from a pipeline of the Core Network or secondary transmission.

The Spanish gas sector has an extensive transmission and distribution network that reaches a length of more than 95.000 kilometres and adds up to 8 million supply points.

Figure A.8. Evolution of the length of natural gas transmission and distribution networks (km)



Source: Sedigas

UlAmo, the pipeline network has 19 compressor stations that allow the gas to be conveyed from the different entry points of the system to its final Any, showing at the

Figure A.**7**.

Regasification plants

At the end of 2023, the gas system had 7 operational regasification plants. Avas, the El Musel plant was incorporated as a reinforcement of European security of supply, which began its operation in July 2023. This plant is subject to a special and temporary regime in accordance with Order TED/578/2023 of 7 June 2007 laying down the technical conditions for the provision of liquefied natural gas logistics services at the regasification plant in the port of El Musel. This terminal, although Aene as the main air the provision of LNG logistics services, emits the gas needed for the efficient boil-off gas to the *network*.

Overall, the Spanish regasification plants have the following characteristics:

- Regasification capacity: 1.945 GWh/day.

  The average production of the plants during 2023 was 679 GWh/day.
- LNG storage capacity: 3.6 million m^3 of LNG (22.5 TWh).

  The average tank filling level during 2023 was 66.8 % (15 TWh).

The following table shows the operational regasification plants Avas and their technical characteristics:

Table A.39. Regasification plants

			LNG storage capacity tank load			Berths
Plant regaslficadon	Maximum vaporisation capacity (Nm */h)	Number of tanks	M'LNG	GWh/day	Steering' berths	m¹ LNG
Barcelona	1.950.000	6	760.000	17	2	266.000
Huelva	1350.000	5	619300	17	1	175.000
Cartagena	1350.000	5	587.000	17	2	266.000
Bilbao	800.000	3	450.000	5	1	270.000
Sagunto	1.000.000	4	600.000	11	1	266.000
Mugardos	412.800	2	300.000	11	1	266.000
The Musel	800.000	2	130.000	9	1	266.000
Total	7.662.800	27	3.446.500	87	9	Up to 270.000

Source: Enagas GTS

Underground storages

In 2023, the gas system has 4 underground storages, operated as a single storage for commercial procurement purposes, with the following characteristics:

- U-storage capacity: 34.2 TWh, deducting the cushion gas.
- Stocks ranged in 2022 from 20 TWh (February) to 34 TWh (November), of which 20 TWh were strategic minimum security stocks.
- Maximum injection capacity: 125 GWh/day.
- Maximum extraction capacity: 200 GWh/day

A.5.3 Electricity and gas markets, energy prices

A.5.3.1 Electricity markets and prices

The evolution of the final energy price components over the years is reflected in the null and void.

Table A.40. Components of the average final electricity price. Mainland demand. Prices in plant bars.

Other	Day-ahead market	Intrad Lario	Balancing markets	Technical Restricclo	Capacity payments	Interrump.	Adjustment mechanism	Total (nomin prices)	Total (actual prices)
2007	41.08	0.00	0,94	1.34	3,90	0.00	0.00	47,26	61.76
2008	65.91	0.00	0,94	1.66	1,07	0.00	0.00	69,57	87.33
2009	38.17	— 0.02	0,85	1,85	2.49	0.00	0.00	43,3'	54.55
2010	38.46	— 0.02	1,21	2.55	3.49	0.00	0.00	45.68	56.51
2011	50,97	— 0.06	1,12	2.09	6,10	0,00	0.00	60.22	72.17
2012	48.84	— 0.04	2,04	2.58	6,09	0,00	0.00	59,52	— —
2013	46,23	— 0.06	2,30	3.29	6,04	0,00	0.00	57,80	66.66
2014	43.46	— 0.04	1,93	3,76	5,93	0,00	0.00	55,05	63.58
2015	51.67	0,00	1,29	2.98	5.02	1.89	0.00	62.85	72.95
2016	40,63	0,00	0,91	2.19	2,76	1.93	0.00	48.42	56.32
2017	53,41	0,00	0,82	1.54	2,72	2.06	0.00	60.55	69.07
2018	58,12	— 0,03	0,80	1.53	2,70	1,23	0.00	64.35	72.18
2019	48.58	— 0.02	0,45	1.00	2.64	0,74	0.00	53,41	59.49
2020	35,21	— 0.02	0,42	2,12	2.65	0.02	0.00	40.40	45.15
2021	113.15	— 0.02	1,27	3.00	1,31	0.00	0.00	118.62	128.58
2022	170.44	— 0.20	2,79	4.80	0,32	0.00	26,55	204.59	204.59

Source: Spanish National Commission on Markets and Competition

A.5.3.2 Gas markets and prices

Current gas market situation.

Supplies

The structure of gas supplies and flows at entry points highlights the increasing importance of LNG supplies (55 % in 2021, 71 % in 2022 and 70 % in 2023, compared to 47 % in 2017) and the reduction in the weight of Algeria as the main supplier country (43 % in 2021, 27 % in 2022 and 29 % in 2023, compared to a share of 48 % in 2017).

The customs records published by the Tax Agency and analysed by the CNMC in its Monitoring Report on the Natural Gas Market in Spain show the following facts for 2023:

- The average cost of supplies decreased significantly from EUR 61,62/MWh in 2022 to EUR 38,09/MWh in 2023.

- There is a high correlation between gas supply prices and the price of Brent barrel, as the price of most long-term contracts of Spanish gas traders, mainly with Algeria, is indexed to the price of oil. This explains the price increase at the end of 2021 and during 2022, as well as the fall in prices in 2023.

Wholesale market

It is defined as the market consisting of the transactions carried out by the marketing companies in the Spanish gas system, whether they are carried out at regasification plants, in underground storage facilities (AVB) or in the Virtual Balance Point (PVB) of the pipeline network.

The Spanish wholesale market is characterised by:

- High over-the-counter (*Over The Counter,* OTC), which concentrated 87 % of transactions in 2023.
- Reduced trading *capacity* than in other Member States due to reduced interconnection capacity with France and thus reduced opportunities for arbitration.
- The importance of LNG transactions in regasification plant tanks, for which since April 2020 transactions at plants have been unified at a so-called virtual point (TVB).
- Market concentration in a small number of companies, with a share of 24 % for the top 3 players with the highest purchasing share in 2023.

The main figures that characterised the wholesale gas market in Spain are as follows:

- The total volume traded in transactions on the OTC wholesale market in 2023 was 933 TWh, accounting for more than 250 % of domestic demand, with most of these volumes traded on the TVB, followed by the PVB.
- For its part, the total volume traded on the organised wholesale market (MIBGAS) in 2023 totalled 144 TWh, 46 % of domestic demand, and it should be noted that products with delivery in the PVB, AVB and TVB are traded in MIBGAS.

As regards the marginal wholesale market price, its dynamics can be considered to be influenced by the following prices:

- LNG price in the regasification plant tanks, incorporating the regasification toll, considering that the price of LNG in the tanks depends on the evolution of the raw material price, the cost of transport by methane and the unloading toll.
- Price of the flexible volumes of Algerian gas conveyed by the Maghreb and Medgaz pipelines, indexed to oil.
- Gas price in the southern French balancing area (TRS hub), incorporating exit tolls from the French network and entry to the Spanish network.

The price on the wholesale market is therefore particularly sensitive to changes in the price of LNG, as well as to the evolution of the prices of the main hubs in the EU, even if this influence is offset by the reduced interconnection capacity and the high price of the exit toll from the French network. It is precisely the price on the TRS hub, which is also sensitive to LNG prices and increased by the cost of tolls, which is the closest in the long term to the price on the Spanish market.

Organised wholesale market

On 15 December 2015, the organised gas market, MIBGAS, began operations on which spot products

were traded with delivery to the PVB. In the period up to December 2021, there has been a significant increase in the number of suppliers, volume and number of offers and transactions:

Table A.41. Organised Gas Market Operations, MIBGAS

Operations in MIBGAS			1
Parameter	2021	2022	2023
Number of staff registered	169	175	195
Average daily number of active agents	102	103	117
Traded volume (GWh)	68.793	121.419	143.835
Churn rate (traded volume/domestic demand)	18.9 %	34.3 %	45.8 %
Intraday product volume (D) (GWh)	23.645	28.489	34.375
Daily product volume (D + 1) (GWh)	19.231	50.504	55.482
Daily product volume (M + 1) (GWh)	15.752	17.621	19.527

Source: Wholesale organised gas market 185

As can be seen from the table above, growth in the number of agents, both registered and acvos, persists. In addition, the volume of gas traded on the market continues to increase, with a significant increase in the weight it represents compared with domestic demand.

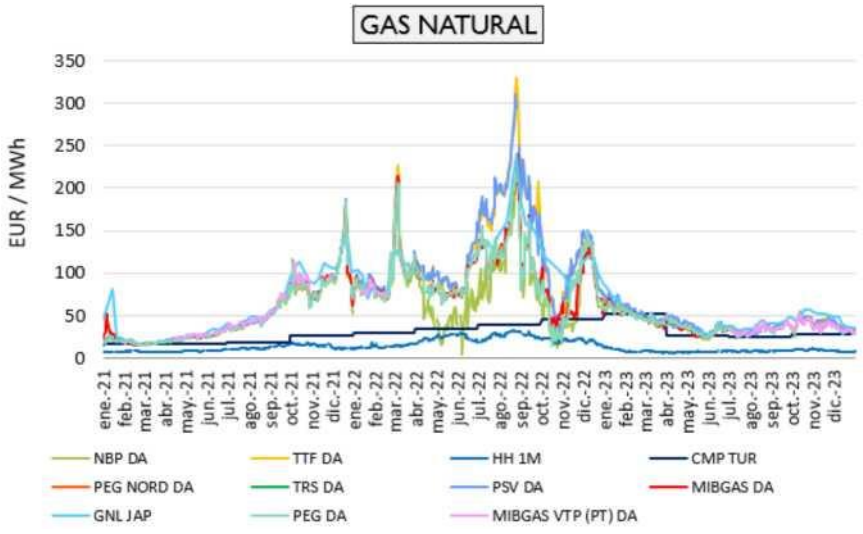
MIBGAS, the market operator, also monitors the *Gas Target Model metrics*. In its Annual Report 2023, MIBGAS shows the improvement in the functioning of the market from the metrics defined by ACER (market depth, price sensitivity of offers and sales, number of transactions and difference between bid and offer prices).

The results obtained on these metrics make it possible to compare the current situation of MIBGAS with that of the main European gas hubs, with a significant improvement in the liquidity of the trading platform.

Focusing on prices, the graph below shows the evolution from gas prices.

Figure A.9. Price evolution of gas markets

185**Annual data during the reporting year.**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

2021 marked a turning point in the gas sector. Thus, after the post-COVID-19 recovery, it moved from an oversupply market to a market without surpluses. The situation in Europe was marked by gas reserves that were below average storage levels throughout the year, increased gas demand in the face of economic reactiveness and a gradual decline in Russian supplies.

As a result, there was a general increase in prices, which was particularly relevant at the end of the year, in a context of high volatility in which new historical peaks were reached, above EUR 180/MWh in the main European markets, MIBGAS, TTF, PEG, PSV and NBP.

Subsequently, at the end of February 2022, Russia's invasion of Ukraine shaken markets, reducing the flow of Russian gas to Europe, pushing pressure on European gas storages. This situation led to a decoupling between markets dominated by LNG, such as MIBGAS, compared with those where Russian pipeline supply was predominant.

Consequently, during the rest of the year, volatility was even higher and historical peaks were exceeded on 2 occasions, first in March above EUR 200/MWh and then in August, when they reached EUR 240/MWh in MIBGAS and EUR 330/MWh in TTF.

Finally, the 2023 financial year in Europe has been marked by falling demand and high storage levels after a warmer winter than usual, as well as improvements in the LNG supply chain, allowing major European markets to return to similar levels and between EUR 30-50/MWh.

Retail

This market is defined as the set of transactions that have taken place between traders and final consumers.

The main characteristics of the Spanish retail market are the following:

- Low proportion of supply points in relation to the population, with low penetration of the segment of Aco due to weather conditions.
- High concentration of companies, with a high market share of the incumbent operator

owning most of the distribution network.

- Final gas sales price higher than the EU average.

The main indicators for this market in 2022 are:

- Number of customers: 8.0 million.
- Number of traders with sales to final customers: 134 traders.

The market shares according to sales and number of customers in 2022 are set out in the following tables:

Table A.42. Market shares of operators in the gas retail market – 1

Operators' shares in the retail market	
Business group	**Share of sales volume**
Naturgy	28.0 %
Endesa	18.8 %
Repsol	8.6 %
Iberdrola	8.0 %
Axpo	6.0 %
Cepsa	4.3 %

Source: Spanish National Commission on Markets and Competition

The value of the Herfindahl-Hirschman Index186 (HHI) was 1.376, reflecting a low concentration in terms of natural gas sales.

Over the years, the concentration of businesses based on sales has been decreasing, with Naturgy being the most affected group of companies, from 40 % in 2017 to 28 % in 2022. In addition, there has also been a decrease in the share of the five largest traders, which have evolved from an aggregate share of 76 % in 2017 to 69 % in 2022, as a result of the growth of small traders and corporate operations in the sector.

Table A.43. Market shares of operators in the gas retail market – 2

Operators' shares in the retail market	
Business group	**Share on number of customers**
Naturgy	46.0 %
Endesa	20.6 %
Iberdrola	15.3 %
TotalEnergies	11.2 %
Repsol	3.0 %

Source: Spanish National Commission on Markets and Competition

The value of the Herfindahl-Hirschman Index187 (HHI) was 2.907, reflecting a higher concentration in terms of customers.

- Switching rate: in 2022 it stood at 19.0 %, continuing an increasing trend from 8 % in 2019.

186 **Index used to analyse the level of concentration in a market. At a higher level, a higher degree of concentration. A market is normally considered as unconcentrated with values below 1.000, between 1.000 and 1.800 as moderately concentrated, and with a value of more than 1.800 as a concentrate**

187 **Index used to analyse the level of concentration in a market. At a higher level, a higher degree of concentration. A market is normally considered as unconcentrated with values below 1.000, between 1.000 and 1.800 as moderately concentrated, and with a value of more than 1.800 as a concentrate.**

- Number of defaults: in 2022, there were 48.892 cuts, representing 6 cuts per 1.000 customers.

In addition, two basic tariff apologies coexist on the retail market:

- The ÚlAmo recurso tariff (TUR), a regulated tariff available to consumers with a consumption of less than or equal to 50.000 kWh/year, at the end of 2022 accounted for 26 % of all customers and 3 % of sales volume.
- The free market with 74 % of total customers and 97 % of sales volume.

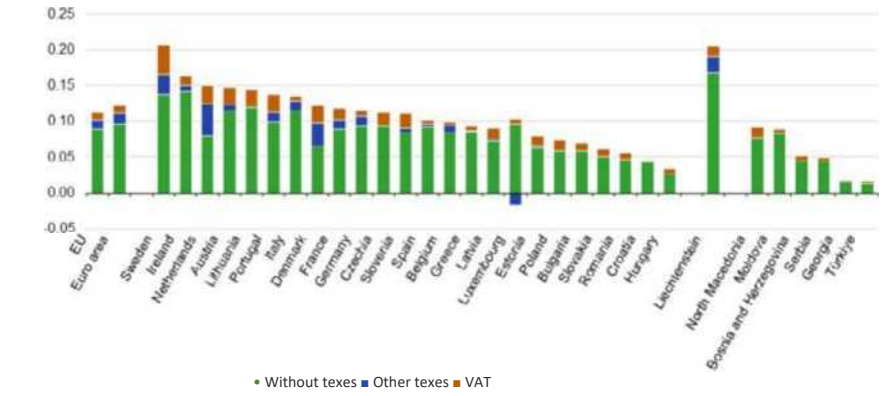
The annual cost of supplying gas to a eligible customer was as follows at the end of 2022:

- TUR1 (consumption below 5.000 kWh/year): EUR 232/year for the average consumer (2.443 kWh/year).
- TUR2 (consumption between 5.000-15.000 kWh/year): EUR 609/year for the average consumer (7.381 kWh/year).
- TUR3 (consumption between 15.000-50.000 kWh/year): EUR 1.439/year for the average consumer (18.467 kWh/year).

The graph below shows an Ava comparison of gas prices for an Aco consumer (in the range 2.500 to 5.000 kWh/year) carried out by the European Commission.

It shows that the price in Spain is on average compared to the other EU Member States, as a result of the implementation of measures such as the extraordinary reduction in value added tax to 5 % until the end of 2023, with the aim of helping Spanish consumers to cope with the higher price of raw materials, following the significant increases in the markets, especially in 2022.

Figure A.10. Price of natural gas for a consumer Uco in the EU and other European countries in the second half of 2023 (EUR/kWh)



Source: Energy prices and costs in Europe, Eurostat, 2024

Projections of price developments with current $pollen and measures

The gas price in Spain at the projection horizon of the Plan corresponds to the international price assumptions for this combat Able recommended by the European Commission.

A.5.4 Main electricity and gas price components

As regards electricity, the final consumer's electricity bill currently incorporates five components:

1. **The cost of energy**, which includes:
   - The cost in day-ahead, intraday and balancing services markets.
   - The cost of capacity payments.
   - The costs of remunerating market and system operators.
2. **Access tolls to cover the costs associated with the payment of electricity transmission and distribution networks.**
3. **The charges for the electricity system**, which cover the following concepts:
   - The specific remuneration scheme for renewables, cogeneration and waste.
   - The additional cost of generation in the electricity systems of non-peninsular territories.
   - The allocation of the Fund for the financing of the General Radiaccal Waste Plan for Part 2 of the Nuclear Combat Cycle
   - The remuneration of the regulator.
   - The annual amounts of the tariff deficit.
   - The balance between revenues and remuneration established for the implementation of capacity mechanisms
4. **The marketing margin applied in energy or power billing**
5. **The cost of renting the measuring equipment**
6. **Electricity taxes and VAT:**
   - The General Electricity Tax Apo (IEE) is 5.1127 %, which applies to energy and power billing. In order to cope with the price increase, in the second half of 2021 and in 2022 the Spanish Government reduced the EEI from 5.1127 % to 0.5 %, the minimum permitted by the European Commission.
   - VAT is 21 % on the total invoice, including the cost of renting the equipment and the electricity tax. As with the EEI, in order to cope with the price increase, in the second half of 2021 the Spanish Government reduced VAT from 21 % to 10 % of electricity for households with 10 kW or less. Subsequently, since 1 July 2022, the government has further reduced the VAT for households, placing the tax on households at 5 %.

Spain forwards to Eurostat the average electricity price for consumers (industrial) rather than Acos per consumption band every six months. This information is taken from the sales weighted national average of the prices charged by the electricity traders to MITECO.

Table A.44. Average retail and industrial electricity price per consumption band

Average electricity price for retail and industrial consumers per consumption band Second Semester 2023				
Consumption band Jco	Annual consumption (kWh)	Price excluding taxes (EUR/kWh)	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)

GIVES	Y/1.000		0,4931	0,5414	0,5930
DB	≥ 1.000 N/A	Y/2.500	0,3005	0,3290	0,3569
DC	≥ 2.500 N/A	Y/5.000	0,2579	0,2822	0,3071
DD	≥ 5.000 N/A	Y/15.000	0,2294	0,2500	0,2757
FROM	≥ 15.000 N/A		0,1831	0,1980	0,2298
Non-Jco consumption band	Annual consumption (MWh)		Price excluding taxes (EUR/kWh)	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)
AI	Y/20		0,2770	0,3072	0,3509
IB	≥ 20 N/A	Y/500	0,1987	0,2111	0,2525
CI	≥ 500 N/A	Y/2.000	0,1769	0,1879	0,2255
ID	≥ 2.000 N/A	Y/20.000	0,1801	0,1902	0,2279
IE	≥ 20.000 N/A	Y/70.000	0,1905	0,1993	0,2397
IF	≥ 70.000 N/A	Y/150.000	0,1946	0,2008	0,2423
GI	≥ 150.000 N/A		0,2066	0,2104	0,2541

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

As regards natural gas, Spain also submits to Eurostat the average price of natural gas for industrial and Aco natural gas by consumption bands every six months. This information is taken from the sales weighted national average of the prices charged by the natural gas traders to MITECO.

The average prices referred to Eurostat for the second half of 2023 are as follows:

Table A.45. Average price of natural gas – Uco and industrial per consumption band

Average price of natural gas – Uco and industrial per band of consumption Second Semester 2023					
Band of consumption · Jco	Annual consumption (GJ)		Price without taxes (EUR/kWh)	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)
D1		Y/20	0,1057	0,1103	0,1158
D2	≥ 20 N/A	0,0919	0,0962	0,1010	0,0897
D3		≥ 200 N/A	0,0681	0,0721	0,0758
Band of consumption No · Jco	Annual consumption (GJ)		Price without taxes (EUR/kWh)	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)
I1		Y/1.000	0,0479	0,0497	0,0522
I2	≥ 1.000 N/A	0,0655	0,0676	0,0709	0,0890
I3	≥ 10.000 N/A	0,0547	0,0566	0,0595	0,0882
I4	≥ 100.000 N/A	0,0500	0,0518	0,0544	0,0933
I5	≥ 1000.000 N/A	0,0465	0,0482	0,0506	0,0921
I6		≥ 4.000.000 N/A	0,0349	0,0364	0,0382

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A.5.5. Nuclear energy in Spain

A.5.5.1 Separate and phased operation of the nuclear park

The companies owning the nuclear park and Empresa Nacional de Residuos RadiacAvos, S.A., S.M.E. (Enresa), a public company responsible for the gesAón of the aforementioned waste, as well as for the decommissioning and decommissioning of nuclear installations, have unanimously agreed on a timetable for the orderly and staggered cessation of operation of the seven remaining nuclear reactors.

Following the consensus reached between the various actors involved, four reactors will be phased out during the period of validity of this NECP. The remaining three will do so by the end of 2035. This phased cessation of operation of the nuclear park is consistent with the full supply of electricity, as

demonstrated in the reports from Red Eléctrica de España (see Annex D.2).

It is also consistent with the key objective of this NECP to achieve a mimination of emissions in 2030 of at least 32 % compared to 1990.

As a result of the abovementioned agreement between the parties, there is a sufficiently comfortable time staging to ensure that dismantling processes are carried out in appropriate conditions, both technical and human equipment availability. In addition, the agreed time frame will allow it to properly capitalise on the existing Gesonated by Enresa fund to carry out the spent nuclear combat water, radioactive waste and the decommissioning and decommissioning of the facilities.

A.5.5.2 Security of fuel supply

By contract with the sector, the public company Enusa Industrias Avanzada, S.A., S.M.E. (Enusa) is responsible for the commercial gesAon of the supply of raw enriched uranium to all Spanish nuclear power plants. It acts as a central purchasing body for all the plants, for which it acquires the uranium concentrate on international markets on the basis of price, diversification and security of supply criteria, and procures conversion and enrichment services from foreign suppliers.

In 2023, the uranium concentrate uAlised by Spanish reactors came from Kazakhstan (65.8 %), Uzbekistan (10.9 %), Australia (9.7 %), Namibia (6.3 %), Russia (3.4 %) and Niger (3 %), with a low draught from South Africa (0.9 %). In response to the EU's recommendation to reduce the energy dependency of Russia, Enusa has taken the necessary measures to mitigate the effects of any lack of supply of Russian uranium. These measures consist of opting for the flexibilities allowed by existing contracts with other suppliers and the uranium stocks available, in accordance with the provisions of Royal Decree 1464/1999 of 17 September on aircraft in the first part of the nuclear combat cycle. This is complemented by additional uranium purchases. This policy for the diversification of uranium pools and the provision of the aforementioned Aene stocks as an objection to the supply to Spanish nuclear power plants in the coming years. Enusa also has a nuclear combat plant in Salamanca, which supplies all Spanish nuclear power plants with the exception of Trillo. In 2023 Enusa manufactured 814 combusAbles containing 277.420 tonnes of uranium. Of these, 500 combusAbles containing 158.944 tonnes of uranium were exported to Belgium, Finland, France and Sweden, accounting for 57 % of total production.

In addition to the agreements that the Atulars of the nuclear power plants have established with the companies Tecnólogas of the existing Nuclear Power Plants in Spain (PWR (WesAnghouse and KWU) and BWR (General Electric)), Spain has a large sector of engineering and service companies in the field of nuclear energy.

Without prejudice to the above, it should be noted that the *Euratom Supply Agency* (ESA) is an event created by the Euratom Treaty for the purpose of securing the supply of natural and enriched uranium in the European Union by matching domestic supply and demand, for which it has a right of option over natural and enriched uranium produced in the territories of the Member States, and the exclusive right to conclude contracts relating to the supply of such materials from inside or outside the Community.

A.5.5.3 General plan for radioactive waste

Article 38 bis of Law 25/1964 of 29 April on nuclear energy (inserted by the ninth final provision of Law 11/2009 of 26 October regulating co-owned investment companies in the real estate market) provides that spent radioactive waste and spent nuclear waste and the decommissioning and decommissioning of nuclear installations are to provide an essential public service reserved for the

Atularity of the State. Enresa is entrusted with the GesAón of that public service, in accordance with the General RadiacAvos Waste Plan (GRWP), a document in which the Government establishes its policy on the gesAón of radioactive waste, including spent nuclear combat, and the decommissioning of nuclear installations.

The GRWP sets out the strategies, necessary actions and technical solutions to be developed in the short, medium and long term, aimed at the proper gesAon of radioactive waste, the dismantling and decommissioning of nuclear and radiacve facilities and the other related Aids, including the economic and financial forecasts for carrying them out.

The 7th GRWP, currently in force, was approved by Council of Ministers Agreement of 27 December 2023.

The reference scenario adopted by this Plan provides for the maintenance of the operational capabilities of the El Cabril storage centre (Córdoba) for the gesAon of medium, low and very low acidity radioactive waste. In addition, provision is made for the temporary use of spent nuclear combat and high-avid waste in nuclear power stations by setting up a Decentralised Temporary Storage (ATD) in each nuclear power plant with spent combusAble (Almaraz, Ascó, Cofrentes, Santa María de Garoña, José Cabrera, Trillo and Vandellós II). The DTAs will remain operateAvos until all spent combusAble and radioactive waste from high Adult is transferred to the Deepted Geological Storage (AGP), which is expected to be put in place in 2073. In March 2020, the 7th GRWP began with the submission of a proposal by Enresa to MITECO and the launch, for the first time for a GRWP, of its Strategic Environmental Assessment, in accordance with the provisions of Law 21/2013 of 9 December on environmental assessment.

First, the public administrations concerned and the persons concerned were consulted in advance in order to determine the scope of the Strategic Environmental Study. In response to the enquiries, the Directorate-General for Environmental Quality and Assessment determined that scope by means of a Resolution of 29 October 2020.

Subsequently, Enresa drew up a new version of the draft Plan and its Strategic Environmental Study, which were submitted to the public information and consultation procedures required by the Strategic Environmental Assessment between April and June 2022. Taking into account the allegations received, in November 2022 Enresa drafted a new version, which was someAda to the reports of the CSN and the Autonomous Communities required by the aforementioned Article 38a of Law 25/1964.

In the light of the contributions received, the draft 7th GRWP was drawn up in February 2023 and forwarded to the State Secretariat for the Environment, which issued the Strategic Environmental Declaration by means of a Resolution of 14 July 2023 of the Directorate-General for Environmental Quality and Assessment.

The terms of that declaration were taken into account in the final version of the Plan, which was approved by agreement of the Council of Ministers on 27 December 2023. Subsequently, as provided for in Law 25/1964, on 20 June 2024, the Secretary of State for Energy informed the Cortes Generales of this Plan.

Moreover, previously, on 23 January 2024, the 7th GRWP was notified to the European Commission, in accordance with the provisions of Directive 2011/70/Euratom establishing a Community framework for responsible and safe gesone for spent nuclear fuel and radioactive waste. The 7th GRWP was drawn up on the basis of the PNIEC 2021-2030, which sets out forecasts for the evolution

of the contribution of nuclear energy to the energy mix, including a timetable for the orderly cessation of operation of nuclear power plants between 2027 and 2035.

As regards the financing of the gesAón of radioactive waste and the decommissioning of nuclear installations, the sixth additional provision of Law 54/1997 of 27 November 2003 on the electricity sector, declared in force by Law 24/2013, provided, further to the amendment made by Law 11/2009 of 29 October 2015, that this public service is to be financed by a system of charges to be charged to producers of radioactive waste.

Subsequently, following the amendment of the first additional provision of General Tax Law 58/2003 of 17 December 2003, carried out by the eleventh final provision of Law 9/2017 of 8 November 2003 on Public Sector Contracts, the consideration received for the services provided by Enresa has ceased to have the legal nature of a tax, and is now regarded as a non-tax public asset supply.

This financing system is based on the 'polluter pays' principle, and is based on the aforementioned public financial benefits paid by radiacAvos waste generators and which feed into the so-called 'Fund for the Financing of PGRR AcAvities', in accordance with the sixth additional provision of Law 54/1997 of 27 November 1992 on the Electricity Sector.

Pursuant to that sixth additional provision, the tax headings and tax elements for determining the share of those public financial benefits may be reviewed by the Government by Royal Decree on the basis of an updated economic and financial report on the cost of the corresponding amounts drawn up by Enresa.

Taking into account the above, the Government has approved Royal Decree 589/2024 of 25 June amending the fixed unit rate relating to the non-tax public financial contribution financing the service of Empresa Nacional de Residuos RadiacAvos, S.A., S.M.E. (Enresa) to nuclear power plants in operation, which sets the value of the fixed unit rate at EUR 10,36/MWh.

A.5.6 Description of energy subsidies (including fossil fuels)

In Spain, the consumption of energy products of fossil origin is subject to the Oil Tax and the Special Coal Tax, which are governed by Law 38/1992 of 28 December 1992 on Excise Duties (BOE of 29 December), LIE (hereinafter 'LIE') and the Regulation on Excise Duties, approved by Royal Decree 1165/1995 of 7 July (BOE of 28 July). In both cases they are harmonised at European Union level under Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (OJEU L 283 of 31 October), which already includes environmental protection requirements.

In addition to the natural purpose of collection, both taxes pursue an environmental objective by incorporating into the price of these products the social costs associated with their consumption, which are not reflected in the market price. Thus, the following are a protohpic example of the use of taxes as an instrument of economic policy, in accordance with the second paragraph of Section 1 of Article 2 of General Tax Law 58/2003 of 17 December (BOE of 18 December): 'Taxes, in addition to being a means of obtaining the resources necessary to support public expenditure, may serve as instruments of the general economic policy and serve to achieve the principles and aims set out in the Constution.'

Tax subsidies

Spain applies certain subsidies to uses such as combusAbles or fuel of energy products. The tax on hydrocarbons saAsfecho for the use of diesel in agriculture and livestock farming is partially refunded, the same for professional use such as the transport of goods, passengers and taxis subject

to certain limits. Exemptions from this tax are regulated in Articles 9 and 51 of Law 38/1992 of 28 December on Excise Duties. In addition, the reduced taxation requirements set out in Article 50 of that Law apply, differentiating according to use. In particular, the following reductions for hydrocarbon use are covered:

- Diesel fuels used as fuel in vehicles belonging to arch 54.2 of Law 38/1992 (stationary engines, special purpose vehicles, agricultural vehicles) and, in general, as combusAble (heating).
- LPG depressed for uses other than fuel.
- Natural gas not for use other than fuel, as well as natural gas removed for use as fuel in stationary engines.
- Natural gas released for professional purposes provided that it is not used in cogeneration processes and direct or indirect generation of electricity.
- Kerosene depressed for use other than fuel.

The Member States are currently working on a thorough revision of Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity in order to make it viable and provide greater certainty and clarity in its application, taking particular account of the review of the taxation of all energy products, as well as the tax treatment of new products, and the taxation of relevant sectors.

With regard to the importance of the Energy Taxation Directorate, the Annual Report on TaxaAon 2022 states: *As part of the Fit for 55 package, the Commission's July 2021 proposal for the recast of the Jene Energy Taxation Direction Jene objected to changing the way energy products and electricity are taxed in the EU and to promote the green transition for all. The proposed new rules also aim to address potential distortions in the internal market and ensure revenues for Member States from these taxes. In addition, they will update the scope of the Directive, as well as the minimum tariffs, remove obsolete exemptions and reductions, which are inflammating the use of fossil fuels, for example in the EU's aviation and marine transport sectors, to the Jempo that will promote clean technologies. In addition, the updated rules will facilitate the transition from fossil fuels to clean combat Jbles and support compliance with the ambitious EU Objectives on reducing greenhouse gas emissions and energy savings*.

Spain agrees on the path of international coordination in the field of taxation, taking into account the proposals and recommendations for reform put forward by the European Commission. One measure that has been adopted from among the legislative package proposed in the Fit for 55 package is the new Carbon Border Adjustment Mechanism (CBAM) set out in Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 and will initially apply to imports of goods whose production is particularly carbon-intensive and at higher risk of carbon leakage (Annexes I and II of the Regulation) and may gradually extend its scope.

Measures to eliminate dependence on Combus: fossil fuels and subsidies

Within the framework established by Law 7/2021 of 20 May on climate change and energy transition, the issue of fossil fuels is being addressed in order to meet the objectives of reducing emissions laid down in the international treaties and the normaAva of the European Union towards 2030 and to achieve climate neutrality by 2050, as soon as possible.

This law dedicates its policy III to measures related to the energy transition Aca and combusAbles.

Firstly, no new exploration authorisations, intrusion permits and hydrocarbon exploitation concessions will be granted throughout the national territory, including the territorial sea, the exclusive economic zone and the conAnental platform. Secondly, it is necessary to initiate a process that gradually upholds consistency between public aid or incendients and climate change mistration objections. As a general rule, the law lays down that the application of new tax advantages to energy products of fossil origin must be properly prosecuted for reasons of social or economic interest or in the absence of technological alterations.

Finally, provisions are introduced to promote renewable gases, including biogas, biomethane, hydrogen and other disruptive combustion plants. Thus, it is introduced into the law, on the one hand, that the Government will promote, through the approval of specific plans, the

penetration of these combusAbles and, on the other hand, a provision to reduce specific emissions in the air transport, maryAmo and heavy road transport sector through the integration of renewable energies and the establishment of objectives for the supply of biofuels and other renewable fuels of non-biological origin. In order to avoid the use of biocombusAbles that have a negative impact on the environment, compliance with the sustainability and air quality protection criteria set out in the Community normaAva is required.

Another way to eliminate subsidies for fossil fuels is support for the promotion of renewables. Among others:

- Existence of a specific remuneration scheme that ensures a reasonable return on renewable energy, cogeneration and waste technologies.
- Various support programmes for the promotion of renewable energy sources.
- Aid for self-consumption
- End use support: sustainable mobility, energy efficiency actions in industrial uses and in the residential sector, in relation to energy rehabilitation

Part of these aid lines are currently included in the recovery, transformation and resilience plan approved for Spain and in its strategic projects, under the PERTE ERHA to support renewable energy, green hydrogen and storage. They are granted by the Ministry for the Ecological Transition and the Demographic Challenge and are ploughed up through the InsAtuto for Energy Diversification and Saving (IDAE).

Table A.46. Energy subsidies 2020-21

Category	Description	Legal basis in 2019	Type No small assimilable	Type	QA9Aid *	Ex9ntion plans
Energy Subsidies 2019 – Prosecutors						
Reduced Impositional Rates 9	Reduced tax rate for mineral oil tax on gas oil u0lissed as fuel in vehicles referred to in Article 54.2 (agriculture)	Law 38/1992 on excise duties, Art. 50	EUR 0,379/litre	0,09671 EUR/litre	EUR 0,28229/litre	
	Natural gas de-0N for professional purposes provided that it is not used in cogeneration processes and direct or indirect generation of electricity	Act 38/1992 of 28 December 2013 from	EUR 1,15/gigajoule	EUR 0,15/gigajoule	EUR 1/gigajoule	
	Biodiesel for use as fuel in the uses provided for in Article 54 (agriculture and livestock farming) and in general as fuel 0	Act 38/1992 of 28 December 2013 from	EUR 0,379/litre	0,09671 EUR/litre	EUR 0,28229/litre	
Exemptions and refunds	Exemption from mineral oil tax for energy products supplied for u0lisation as fuel for air navigation dis0nta for private pleasure flying	Law 38/1992 on excise duties, Art. 9			Total amount of IEH (kerosene: EUR 0,378/litre))	
	Exemption from mineral oil tax for their u0lisation as fuel in rail transport, construction, modification, testing and maintenance of aircraft and vessels, dredging operations of waterways and ports, injection into blast furnaces for chemical reduction purposes, additions to coal that is u0lice as main combatable	Law 38/1992 on excise duties, Art. 51			Full amount of IEH (fuel function)	
	Refund of hydrocarbon tax sa0sfecho for u0-energy products in pilot projects for the technological development of less polluting products or mixed with other contaminated products	Law 38/1992 on excise duties, Art. 52			Full amount of IEH (fuel function)	
	Partial refund of mineral oil tax sa0sfecho on commercial gas oil (applies to certain vehicles for use in the transport of goods, passengers and taxis)	Law 38/1992 on Excise Duties Article 52a 6a			EUR 0,049/litre	
	Partial refund of oil tax sa0sfecho on diesel used in agriculture and livestock	Law 38/1992 on Excise Duties Article 52b	EUR 0,379/litre	EUR 0,033/litre	EUR 0,346/litre	

Table A.47. Measures to eliminate dependence on fossil fuels

Name or Description	Sector	Objective	Vector	Start of Implement	End of Implement	2.020	2.021	Curre
Aid programme for energy renovation of existing buildings (PAREER-II)	Homes	Support for energy	Renewable	01/01/2018	01/01/2025	6.927.320.524	7.887.722.273	EUR
Building Energy Renovation Programme (EPSR)	Homes	Support for energy	Renewable	01/08/2020	01/01/2026			
Capacity payment: Investment Incentive to Availability Incentive – HIDRAULICA	Convergence – Electricity	Support for production	Electricity	01/01/2008				
Excise duty on mineral oils – Reduced biogas rate for stationary engines	Energy	Support to	Biogas	31/10/2013				
Specific remuneration scheme for renewable	Electricity generation	Support for	Electricity	01/11/2014				
Royal Decree 477/2021 of 29 June 2015 approving the direct grant to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementation of various incentive programmes linked to self-consumption and storage, with renewable energy sources, as	Dwellings, Industry, Public Sector	Support for production	Renewable	30/06/2021	31/12/2023			
Royal Decree 1124/2021 of 21 December 2015 approving the direct grant to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementation of incentive programmes for the deployment of renewable thermal energy installations in different sectors of the	Dwellings, Industry, Public Sector	Support for production	Renewable	23/12/2021	31/12/2023			
MOVES I, II, III plan	Transport	Support for energy	Petroleum derivatives	01/01/2019	31/12/2023			

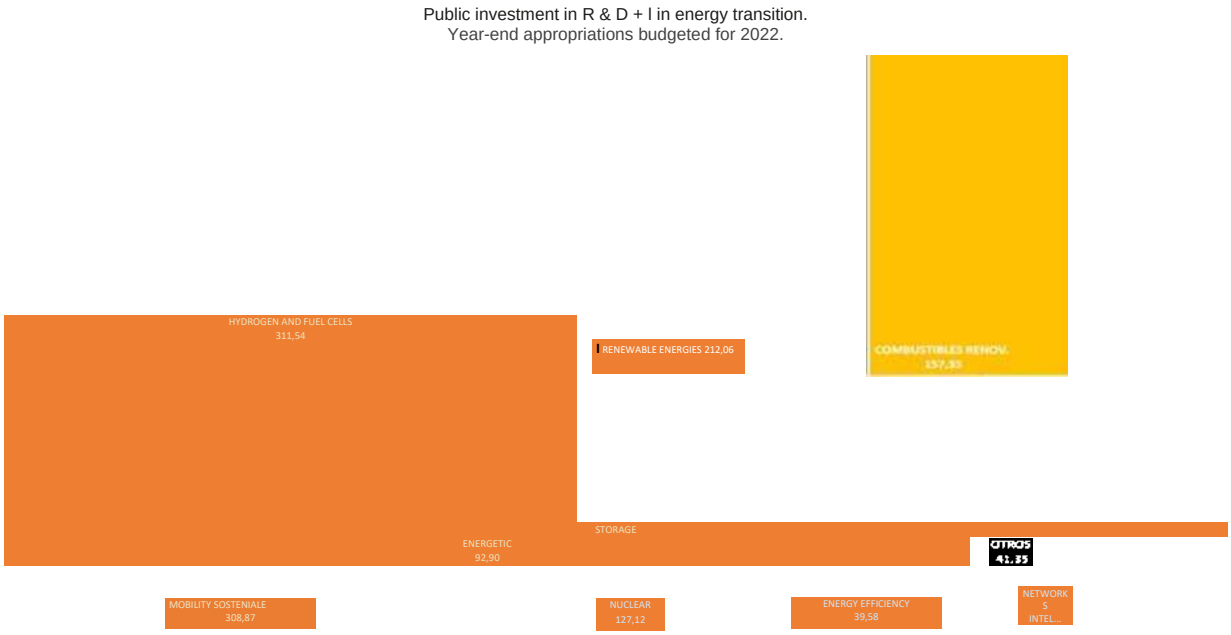
A.6 ANNEX ON PUBLIC INVESTMENT IN RESEARCH AND INNOVATION

This section contains the most recent information available on public investment in Investing, Development and Innovation related to Energy Transition Policies.

In the 2022 budget year, the amount deducted from expenditure on R & D & I in the field of energy transition was EUR1881.299.8 million, an increase of 95.1 % compared to 2021, which amounted to EUR 666.1 million. This increase is mainly due to aid called for by IDAE and financed by the RRF in programmes aimed at incenAvar unique and innovative projects in electric mobility (MOVES singular II), in energy communities (EC implemented), in biogas facilities, in the innovative and knowledge-based renewable hydrogen value chain, in energy storage and in innovative recycling facilities for wind turbine blades.

Figure A.11 shows the distribution of total expenditure by technology, with the areas with the highest funding being those related to hydrogen and combat batteries technologies and sustainable mobility, which account for 24.0 % and 23.8 % respectively.

Figure A.11. Distribution of R & D & I expenditure by technology



Source: Prepared at 1r of the 1st Statistics on R & D & I Budget Credits. MICIU This expenditure represents 9.3 % of the total public appropriations deducted from R & D & I in 2022. 97 % come from the General State Budget (GMP) and 3 % from the budgets of the Autonomous Communities (ACs). Of the part of expenditure financed by the PGE, 66.1 % of the expenditure relates to actions implemented by MITECO, mainly through IDAE (mentioned above) and 33.8 % to MICIU (in 2022, Ministry of Science, Innovation and Universities) and its subordinate bodies, both funders (REA, CDTI) and implementers (CIEMAT, CSIC).

Public funding is financed and implemented through different instruments and modalities of parcipation. Table A.42. shows the breakdown by purpose of financing. It can be observed that the public investment

188This amount includes expenditure appropriations from the General State Budget and the budgets of the Autonomous Communities, regardless of the source of financing (including EU Recovery and Resilience Facility funds) and excluding financial appropriations.

instrument from which the most resources are diverted is the financing of R & D projects, which are awarded mainly through competitive calls for proposals or open lines, with the possibility of presenting different forms of aid (grants or partially repayable aid).

Table A.48. Distribution of public funding by funding object

Subject of financing	Amount Mill. EUR	% Share
Financing of R & D projects by AGE funding agencies (EIP, CDTI, IDAE)	991,4	76,3
Renewable Energy and Hydrogen Supplementary Plan	5,0	0,4
R & D implemented by Public Investing Bodies (CIEMAT, CSIC, INTA)	149,0	11,5
Direct funding to international infrastructures and organisations (ITER, CERN, EU-SOLARIS, IFMIF-DONES,...)	103,1	7,9
Direct aid for the creation and maintenance of public R & D centres of State (co-) Mtularity (CENER, CNH2, CNIAE, CIUDEN,...)	25,4	2,0
Others [1]	25,9	2,0
TOTAL	**1.299,8**	**100,0**

(1) Includes direct funding to regional R & D bodies and aid to Ges1R & D projects by regional agencies

The Supplementary Plans are a new instrument launched in 2021 and 2022 that allows collaboration with the ACs on R & D & I actions that bring together common priorities of regional and state smart specialisation strategies, including the Supplementary Plan on Renewable Energy and Hydrogen. This plan has been divided into ten ACs. Aragon, Principality of Asturias, Canary Islands, Cantabria, CasAlla and León, CasAlla-La Mancha, Madrid, Extremadura, Navarre and the Basque Country) and CSIC. The plan has a total public investment of EUR 92 million co-financed through funds from the Recovery, Transformation and Resilience Plan (EUR 71.4 million) and regional funding (EUR 20.6 million). The implementation of the supplementary plans by the ACs is being carried out through various initiations such as direct aid or calls to finance R & D & I projects. The amount allocated to the supplementary plan in Table A.42 corresponds to the transfers to the ACs made in the 2022 financial year financed by the RRF funds (it should be noted that in 2021 it was transferred to the ACs. EUR 51.8 billion financed by the RRF) and the part financed by regional funds through the 2022 budgets of the ACs. In addition, CSIC is expected to implement EUR 17.4 million (EUR 5.4 million in 2022 and EUR 6 million in 2023 and EUR 2 024 million in and), although these costs have been included in the table as the implementation of the OP's R & D.

In addition, the CDTI gesAona another APO of instruments such as the INNVIERTE company, whose objective is to boost venture capital investment in the Spanish technology sector, boosting innovative or technology-based companies (mainly small and medium-sized enterprises) and facilitating the stable holding of private capital in the long term through investment in public-private vehicles. In 2022, through INNVIERTE, equity investments in two energy and environment companies have been approved. The commitment made amounts to a total of EUR 2.2 million which, together with the contributions of EUR 2.65 million made by other investors, make a total of EUR 4.87 million invested in these two companies. The Aids of the beneficiary companies are related to control systems for opting wastewater treatment processes and development of Liao battery cells (components and cell) in solid state. This investment is in addition to the capital investments approved in 2 021 in five companies with aircraft related to self-gas engines for heavy duty vehicles, rigid candles for ships, online photovoltaic power generation gesAon, gasification waste disposal technology and control system for opting out waste water treatment processes. The commitment made in 2021 amounts to a total of EUR 8.7 million which, together with the contributions of EUR 15.3 million made by other investors, make a total of EUR 24 million invested in

these five companies.

A.7 ANNEXED TABLES GOVERNANCE REGULATION 2018/1999

A.7.1 Table Annex I Part 2 PNIEC Scenario 2023-2030

Table A.49. Parameters, variables and balances of the PNIEC Scenario 2023-2030

		Units	2019	2020	2025	2030
	1 General parameters and variables					
1	Population	millions	47,11	47,33	48,9	49,6
2	GDP (constant 2016)	EUR billion	1.197,0	1.060,9	1.235,8	1.345,5
4	Number of households	millions	18,58	18,69	19,70	20,31
5	Household size	inhabitants/household	2,53	2,53	2,48	2,44
7	Passenger-km	million pkm				
	Buses	million pkm	43.295,60	24.834,90	63.907,12	87.114,13
	Automobiles	million pkm	502.359,86	388.008,00	450.185,57	397.101,71
	Motorcycles	million pkm	38.711,81	29.544,06	39.168,08	39.844,65
	Railway	million pkm	36.816,73	16.266,47	44.569,38	67.285,80
	Aviation	million pkm	NA	NA	NA	NA
	Inland navigation	million pkm	NA	NA	NA	NA
8	Freight transport	million tkm				
	Road	million tkm	301.631,51	263,466,80	317.196,00	324.346,54
	Railway	million tkm	10.459,21	8.969,60	20.546,19	33.280,07
	Inland navigation	million tkm	NO.	NO.	NO.	NO.
9	International import prices	EUR/GJ				
	Petroleum	EUR/GJ	10,55	6,62	10,81	12,11
	Gas	EUR/GJ	4,71	2,18	8,19	7,84
	Coal	EUR/GJ	2,18	1,65	3,57	3,49
10	Carbon prices in the ETS	EUR/ton CO2	26,15	25,27	82,80	82,80
11	Assumptions of exchange rates against the euro and the US dollar (if applicable)	Dollar/EUR				
12	Number of heating degree days (HDD)		NO.	NO.	NO.	NO.
13	Number of cooling degree days (CDD)		NO.	NO.	NO.	NO.
14	Cost assumptions of uWlised technologies in modelling for the main perWnentes technologies.		See Table A.7	See Table A.7	See Table A.7	See Table A.7
	2 Energy balances 9and indicators					
	2.1 energy supply					
1	Indigenous WPO production of combusWble	ktoe	33.822,66	34.458,01	43.761,56	51.588,49
	Coal	ktoe	0,00	0,00	0,00	0,00
	Crude oil and petroleum products	ktoe	40,41	28,29	146,89	147,99
	Natural gas	ktoe	116,21	41,62	49,03	49,40
	Nuclear power	ktoe	15.218,00	15.174,00	14.653,04	9.164,46
	Renewable energy sources	ktoe	17.631,24	18.351,02	27.623,75	40.053,25
	Waste	ktoe	525,79	539,72	373,39	422,06
	Biogases	ktoe	291,01	323,37	915,47	1.751,33
2	Net imports by WPO of combusWble189	ktoe	92.158,53	76.371,72	68.629,97	52.373,07
	Coal	ktoe	5.071,75	3.099,84	1.469,76	951,54
	Crude oil and petroleum products	ktoe	56.121,85	45.661,24	47.661,76	37.467,68
	Natural gas	ktoe	30.780,63	27.873,77	21.035,11	17.940,07
	Electricity	ktoe	590,05	281,99	— 977,64	— 2.497,09
	Renewable energy sources	ktoe	— 405,75	— 545,13	— 559,03	— 1.489,12
3	Import dependency from third countries	%	73.15 %	68.91 %	61.06 %	50.38 %
4	Main import sources (countries) with the main energy carriers (including gas and electricity) 190					
	First country of origin of electricity imports	% of total imports			France: 54 %	Portugal: 68 %
	Second country of origin of electricity imports	% of total imports			Portugal: 44 %	France: 30 %
5	Gross inland consumption by WPO combusWble	ktoe	125.981,19	110.829,73	112.391,53	103.961,56
	Coal	ktoe	5.071,75	3.099,84	1.469,76	951,54
	Crude oil and petroleum products	ktoe	56.162,26	45.689,52	47.808,65	37.615,67
	Natural gas	ktoe	30.896,84	27.915,39	21.084,14	17.989,46
	Nuclear power	ktoe	15.218,00	15.174,00	14.653,04	9.164,46

189Including electricity and divided between intra-European and non-European.
190Only imports of electricity are included.

		Units	2019	2020	2025	2030
	Electricity	ktoe	590,05	281,99	— 977,64	— 2.497,09
	Renewable energy sources	ktoe	17.516,50	18.129,25	27.980,18	40.315,45
	Non-renewable waste	ktoe	525,79	539,72	373,39	422,06
	2.2 electricity and heat					
1	Gross electricity production	GWhe	273.257,00	263.373,00	313.564,72	422.412,60
2	Gross electricity production by fuel Wble	GWhe				
	Nuclear power	GWhe	58.349,00	58.299,00	56.236,91	35.172,28
	Coal	GWhe	13.982,00	6.149,00	100,01	77,96
	Crude oil and petroleum products	GWhe	12.883,00	10.704,00	11.603,59	6.400,23
	Natural gas	GWhe	83.703,01	69.739,00	28.606,83	33.582,19
	Biomass & waste	GWhe	5.640,00	6.292,00	6.309,09	9.993,37
	Hydraulic (excluding pumping)	GWhe	24.646,01	30.507,00	31.517,60	28.764,46
	Wind	GWhe	55.647,00	56.444,00	74.721,00	130.102,00
	Solar	GWhe	15.103,00	20.667,00	88.780,76	150.252,54
	Geothermal and other renewable energy sources	GWhe	937,01	921,00	1.408,93	2.968,90
	Storage	GWhe	2.228,01	3.491,00	14.280,00	25.098,68
	Others	GWhe	139,00	160,01	0,00	0,00
3	Share of electricity generation from cogeneration in total191	%	12.32 %	11.81 %	6.71 %	4.22 %
4	Electricity generation capacity by sources192	GW	112,85	115,96	151,17	214,24
	Nuclear power	GW	7,40	7,40	7,40	3,18
	Coal	GW	10,22	10,22	0,02	0,02
	Crude oil and petroleum products	GW	4,50	4,19	3,22	2,05
	Natural gas	GW	31,79	31,44	30,19	30,03
	Biomass & waste	GW	1,00	1,16	1,38	1,68
	Biogases	GW	0,27	0,27	0,43	0,64
	Hydraulic (excluding pumping)	GW	13,67	14,01	14,26	14,51
	Wind	GW	25,59	26,82	36,15	62,05
	Solar	GW	11,99	14,03	48,80	81,08
	Geothermal and other renewable energy sources	GW	0,01	0,01	0,03	0,08
	Storage	GW	6,41	6,41	9,29	18,91
	Others	GW	0,00	0,00	0,00	0,00
	Heat generation from thermal power generation	GWhe	NO.	NO.	NO.	NO.
	Heat generation from CHP plants193	GWhe	32.210,74	28.713,18	21.282,03	19.000,77
	2.3 processing sector					
1	Combustion Wble inputs for electricity thermal generation	ktoe	18.633,54	14.431,23	5.877,44	6.067,62
	Coal	ktoe	3.528,44	1.608,50	22,94	17,88
	Crude oil and petroleum products	ktoe	2.614,74	2.159,40	1.567,48	903,70
	Natural gas	ktoe	12.760,36	10.663,33	4.265,41	5.086,49
2	CombusWble inputs for other producWvos processes	ktoe	8.672,40	7897,82	7.987,38	9.686,82
	2.4 energy consumption					
1	Primary energy consumption (excluding non-energy consumption)	ktoe	120.628,76	105.026,2	107.474,40	98.448,98
1	Final energy consumption (includes non-energy consumption)	ktoe	90.905,12	78.741,77	83.129,64	77.221,86
2	*Final energy consumption by sector (excludes non-energy consumption7)*	ktoe				
	Industry	ktoe	20.428,14	18.604,39	19.522,78	19.855,66
	Residential	ktoe	14.283,12	14.377,47	13.721,13	12.608,58
	Tertiary and others	ktoe	10.133,46	9.322,39	9.263,97	8.962,69
	Transport	ktoe	37.805,63	27.634,82	32.742,69	27.396,77
	Agriculture, forestry and fisheries	ktoe	2.902,35	2.999,14	2.961,94	2.885,57
	Carriage of passenger	ktoe			20.875,41	17.084,26
	Goods transport	ktoe			11.859,15	10.118,55
	Electrolysers	GW	0,00	0,00	0,65	11,97
3	*Final energy consumption per combus7ble (excludes non-energy consumption7)*	ktoe				
	Coal	ktoe	446,20	395,53	240,63	188,62
	Crude oil and petroleum products	ktoe	44.372,45	34.132,33	36.237,36	28.035,38

191Electricity generated in cogenerations divided by the gross electricity generated, including pumped generation.
192Including dismantling and new investments.
193Including industrial waste heat.

		Units	2019	2020	2025	2030
	Natural gas	ktoe	14.455,85	13.819,04	13.272,27	11.084,79
	Electricity	ktoe	20.165,86	18.886,93	20.758,36	23.543,03
	Heat	ktoe	0,00	0,00		
	Renewable energy sources	ktoe	5895,06	5.510,90	7.350,98	8.449,47
	Wastes (non renewable)	ktoe	217,27	193	352,91	407,98
4	Final Non-Energy Consumption	ktoe	5.352,43	5.803,56	4.917,13	5.512,58
5	Primary energy intensity of the general economy194	toe/million euro	109,72	104,47	86,97	73,17
	2.6 investments					
	Energy-related investment costs compared to GDP	% of GDP			1.7 %	2.5 %
	2.7 renewable energies					
1	Gross final consumption of energy from renewable sources and the share of renewable energy in gross final consumption of energy and by sector and by technology195	%				
	Share of renewable energy in gross final consumption of energy	%	17.85 %	21.22 %	31.80 %	47.86 %
	Heating and cooling	%	17.20 %	17.97 %	24.90 %	37.36 %
	Electricity	%	37.13 %	42.94 %	71.44 %	86.53 %
	Transport196	%	7.61 %	9.53 %	12.00 %	28.00 %
	Contribution of the final consumption of renewable energy in transport to the general objection0.197	%	1.99 %	1.98 %	3.31 %	4.22 %
	Contribution of biocombustion 0 and biogas included in section A of the list in Annex IX198	%	0.01 %	0.09 %	7.30 %	6.90 %
	Contribution of biocombustion 0 and biogas included in section B of the list in Annex IX[30]	%	0.22 %	0.62 %	0.98 %	1.40 %
	Contribution of biocombus0bles consumed in transport produced from food cul0ves	%	1.77 %	1.27 %	1.77 %	1.50 %
	Contribution of renewable combustion 0bles of non-biological origin consumed in transport	%			0.01 %	3.56 %
	Gross final consumption of renewable energy in heating and cooling	ktoe	5.078,21	5.076,37	6.562,21	8.830,16
	Production of electricity of renewable origin.	ktoe	8.943,30	9.846,17	17.531,40	24.450,92
	Gross final consumption of renewable energy in transport[29]	ktoe	1.761,52	1.535,69	2.409,82	3.850,26
	Total gross final consumption of renewable energy	ktoe	15.783,02	16.458,23	26.503,42	37.295,47
	Share of biocombus0s to par0r of food cul0ves	%	5.29 %	2.40 %	2.59 %	2.60 %
	Share of advanced biocombus0bles199	%	0.68 %	2.50 %	5.96 %	19.49 %
	Combined share of advanced biocombus0bles and biogas included in Annex IX listings A and RFNBOs (RFNBOs)	%			6.64 %	17.26 %
	Share of renewable combustion 0bles of non-biological origin (RFNBOs)	%			0.62 %	11.61 %
	Share of renewable energy in buildings	%			48.27 %	67.59 %
	Share of renewable energy in industry	%			27.84 %	42.67 %
	Share of renewable combustion 0bles of non-biological origin in hydrogen consumed in industry	%			4.94 %	74.46 %
2	GHG intensity reduction in transport through the use of renewable energy	%			6.04 %	16.30 %
	3 Indicators related to GHG emissions and removals					
1	GHG emissions by sector (ETS, Effort Sharing Regulation and LULUCF)	teq.CO2	262.594.498	224.193.766	202.044.125	156.664.622
	ETS emissions (in 2013 ETS areas)	teq.CO2	109.504.509	89.028.585	70.356.868	61.056.836
	Effort Sharing Regulation (in 2013 areas)	teq.CO_2	200.078.211	181.639.994	171.804.296	134.132.655
	LULUCF (counted according to the requirements of EU legislation)	teq.CO2	— 46.988.223	— 46.474.813	— 40.117.038	— 38.524.870
2	GHG emissions by IPCC sector and by gas (where per0nent, broken down in ETS and ESR)	teq.CO_2	*Please use for repor/ng on GHG emissions by IPCC sector and gas the same excel template as used for repor/ng on Annex XII to Commission implements/ng Regula/on (EU) 749/2014 (ipar/cle23-table1), next due 15/3/2019. It is provided as separate file.*			
	Transformation, primary energy and exchanges	teq.CO2	11.218.130	10.030.058	8.798.770	6.427.985
	Agriculture	teq.CO2	33.907.490	34.990.397	31.746.039	28.438.928
	Electricity Generation	teq.CO2	44.027.582	30.751.188	13.435.574	12.102.183
	Industry (combus0on)	teq.CO2	46.865.844	41.766.962	35.463.071	28.197.324
	Industry (processes)	teq.CO_2	18.548.602	16.922.674	16.850.273	16.816.625
	Residential	teq.CO_2	16.032.713	16.180.198	12.279.659	8.742.412
	Tertiary	teq.CO2	9.554.945	9.110.758	7.709.630	5.374.365

194Primary energy consumption/GDP.
Intermediate195 trajectories can be found in Table A.11.
196RED III methodology
197It does not include renewable electricity consumed in transport.
Intermediate198 trajectories can be found in Table A.11.
RED III199 Methodology (Direction 2018/2001)

		Units	2019	2020	2025	2030
	Transport	teq.CO2	91.408.403	73.867.848	82.478.142	59.577.156
3	Carbon intensity of the overall economy	teq.CO2/GDP (EUR million)	219,377	211,324	163,495	116,439
4	Indicators related to CO2 emissions	teq.CO2/MWh				
a	Carbon intensity of electricity and steam production	teq.CO2/MWh	0,161	0,117	0,043	0,029
b	Carbon intensity of final energy demand by sector	teq.CO2/toe	3,069	3,07	2,583	2,185
	Industry	teq.CO2/toe	3,202	3,155	2,680	2,267
	Residential	teq.CO2/toe	1,122	1,125	0,895	0,693
	Tertiary	teq.CO2/toe	0,943	0,977	0,832	0,600
	Carriage of passenger	teq.CO2/toe			2,520	2,190
	Goods transport	teq.CO2/toe				
5	Parameters related to disWnta emissions of CO2					
a	Livestock	1000 heads				
	Dairy cattle	1000 heads	814,1	810,5	800,5	778,1
	Dairy cattle dis0nto	1000 heads	5.847,1	5.865,4	5.849,9	5.748,1
	Swine	1000 heads	30.854,8	32.085,5	30.305,2	26.390,4
	Sheep	1000 heads	15.478,6	15.439,2	14.828,7	14.512,9
	For poultry	1000 heads	136.964,5	134.732,7	132.837,0	134.411,6
b	Nitrogen inputs resulting from the application of synthetic fertilisers Wcos	kt nitrogen	1.011	1.059	940	940
C	Nitrogen inputs resulting from the application of esWde l	kt nitrogen	526	533	529	528
D	Nitrogen fixed by nitrogen-fixing culves	kt nitrogen	NE	NE	NE	NE
e	Nitrogen in culWvos residues returning to soils	kt nitrogen	183	189	168	168
f	Area of cultivated organic soils	hectares	NOT	NOT	NOT	NOT
g	Municipal solid waste (MSW) generation	Kg/hab· year	464	464	449	433
h	Municipal solid waste (MSW) going to landfills	%	51.7 %	49.4 %	38.4 %	25.0 %
I	Share of CH4 recovered of the total CH4 generated in landfills	%	22.0 %	22.6 %	24.3 %	24.3 %

All parameters and variables marked in green:
Already requested under current legislation (MMR, RES Direc0ve or Direc0va de Efficiency 0ca)
All parameters and variables marked in red:
They should be provided by considering the results of the complementary tools as standard models of the energy system0.
All parameters and variables marked in orange:
They correspond to indicators that must be calculated using parameters and variables already available in the Excel file provided

N.a. Not applicable. Have not been or/have been released.

N.d. Not available.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

A.7.2 Tables Annex V Monitoring Mechanism RegulaAon (MMR)

Table A.50. Greenhouse gas projections by gases and categories

	Submission Year			2024
	Ms (Member State)			ES
Category Scenario (WEM, WAM, WOM)	2021	2022	2025	2030
	Co_2 (kt)	Co_2 (kt)	Co_2 (kt)	Co_2 (kt)
Total excluding LULUCF WEM	229.069,38	234.657,02	225.527,37	219.466,00
Total including LULUCF WEM	181.192,31	186.787,50	186.264,74	183.208,49
Total excluding LULUCF WAM	229.069,38	234.657,02	188.812,29	147.938,13
Total including LULUCF WAM	181.192,31	186.787,50	148.413,80	109.131,81
	N_2O (kt)	N_2O (kt)	N_2O (kt)	N_2O (kt)
Total excluding LULUCF WEM	44,40	43,87	44,15	43,02
Total including LULUCF WEM	45,34	44,94	44,61	43,48
Total excluding LULUCF WAM	44,40	43,87	42,58	40,58
Total including LULUCF WAM	45,34	44,94	43,03	41,03
	CH_4 (kt)	CH_4 (kt)	CH_4 (kt)	CH_4 (kt)
Total excluding LULUCF WEM	1.519,34	1.516,03	1.387,81	1.285,25
Total including LULUCF WEM	1.523,30	1.522,06	1.393,76	1.291,20
Total excluding LULUCF WAM	1.519,34	1.516,03	1.338,73	1.170,43
Total including LULUCF WAM	1.523,30	1.522,06	1.344,53	1.176,22
	HFCs (kt CO2e)	HFCs (kt CO2e)	HFCs (kt CO_2e)	HFCs (kt CO_2e)
Total excluding LULUCF WEM	3.497,79	4.230,23	3.468,38	3.287,92
Total including LULUCF WEM	3.497,79	4.230,23	3.468,38	3.287,92
Total excluding LULUCF WAM	3.497,79	4.230,23	3.468,38	3.287,92
Total including LULUCF WAM	3.497,79	4.230,23	3.468,38	3.287,92
	PFC (kt CO_2e)	PFC (kt CO_2e)	PFC (kt CO_2e)	PFC (kt CO_2e)
Total excluding LULUCF WEM	51,39	14,39	70,32	60,84
Total including LULUCF WEM	51,39	14,39	70,32	60,84
Total excluding LULUCF WAM	51,39	14,39	50,13	37,74
Total including LULUCF WAM	51,39	14,39	50,13	37,74
	Mix HFCs/PFCs (kt CO_2e)	Mix HFCs/PFCs (kt CO_2e)	Mix HFCs/PFCs (kt CO_2e)	Mix HFCs/PFCs (kt CO_2e)
Total excluding LULUCF WEM	1.343,98	978,88	796,55	104,03
Total including LULUCF WEM	1.343,98	978,88	796,55	104,03
Total excluding LULUCF WAM	1.343,98	978,88	796,55	104,03
Total including LULUCF WAM	1.343,98	978,88	796,55	104,03
	SF_6 (kt CO_2e)	SF_6 (kt CO_2e)	SF_6 (kt CO_2e)	SF_6 (kt CO_2e)
Total excluding LULUCF WEM	240,14	246,52	264,8	295,54
Total including LULUCF WEM	240,14	246,52	264,8	295,54
Total excluding LULUCF WAM	240,14	246,52	264,8	295,54

	Submission Year			2024
	Ms (Member State)			ES
Category Scenario (WEM, WAM, WOM)	2021	2022	2025	2030
Total including LULUCF WAM	240,14	246,52	264,8	295,54

	NF3 ($ktCO_2e$)	NF3 ($ktCO_2e$)	NF_3 ($ktCO_2e$)	NF_3 ($ktCO_2e$)
Total excluding LULUCF WEM	NA	NA	NA	NA
Total including LULUCF WEM	NA	NA	NA	NA
Total excluding LULUCF WAM	NA	NA	NA	NA
Total including LULUCF WAM	NA	NA	NA	NA
	Total GHGs ($ktCO_2e$)	Total GHGs ($ktCO_2e$)	Total GHGs ($ktCO_2e$)	Total GHGs ($ktCO_2e$)
Total excluding LULUCF WEM	288.509,40	294.201,39	280.684,70	270.600,63
Total including LULUCF WEM	240.993,06	246.784,05	241.710,63	234.631,67
Total excluding LULUCF WAM	288.509,40	294.201,39	242.161,16	195.189,49
Total including LULUCF WAM	240.993,06	246.784,05	202.044,13	156.664,62
	Total ETS GHGs ($ktCO_2e$)	Total ETS GHGs ($ktCO_2e$)	Total ETS GHGs ($ktCO_2e$)	Total ETS GHGs ($ktCO_2e$)
Total excluding LULUCF WEM	96.323,71	81.126,96	97.663,39	98.744,04
Total including LULUCF WEM	96.323,71	81.126,96	97.663,39	98.744,04
Total excluding LULUCF WAM	96.323,71	81.126,96	70.356,87	61.056,84
Total including LULUCF WAM	96.323,71	81.126,96	70.356,87	61.056,84
	Total ESD GHGs ($ktCO_2e$)	Total ESD GHGs ($ktCO_2e$)	Total ESD GHGs ($ktCO_2e$)	Total ESD GHGs ($ktCO_2e$)
Total excluding LULUCF WEM	192.185,69	213.074,43	183.021,31	171.856,59
Total including LULUCF WEM	192.185,69	213.074,43	183.021,31	171.856,59
Total excluding LULUCF WAM	192.185,69	213.074,43	171.804,30	134.132,65
Total including LULUCF WAM	192.185,69	213.074,43	171.804,30	134.132,65

** The 1 and 2025 emission projections are s1uses of the Spanish Inventory System for 1r of the results of the Energy Scenario 2030-2030 of the PNIEC. Emissions up to 2022 correspond to the 2024 edition (1990-2022) of the National GHG Inventory Report.*

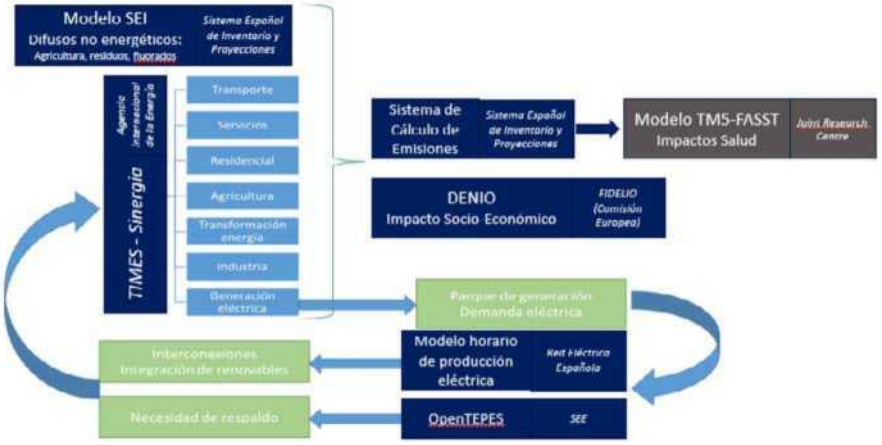
Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

ANNEX B. FORMS

8.1. ENERGY SYSTEM MODELLING

The energy system for the 2021-2030 PNIEC was modelled using the TIMES-Sinergia tool (Integrated Energy Study System) of the Subdirectorate-General for Prospectus and Energy Statistics. In addition, higher-order models have been used to determine the effects of high penetration of renewable energies in the electricity system, in order to make the results comparable with adequate security of supply. The other uAlised model, which will be described below under this heading, has been the EER model.

Figure B.1 Methodology



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

While TIMES-Sinergia covers the energy system in its entirety, the other complementary models are specifically dedicated to the representation of the electricity system. In addition, they include certain characteristics of the electricity system that are not captured by the TIMES-Sinergia model, such as the inclusion of time periods for electricity generation and the incorporation of the technical constraints of the generating units of the system.

The joint use of all models makes it possible to assess back-up needs, energy exchange on interconnections, as well as other technical elements resulting from the integration of high renewable energy inputs into the electricity system, such as verAdos, or adjustments to conventional combined cycle generation. The figure shows the two-way interaction between the TIMES-Synergy energy system model and the EER model. As shown by the results of the generation park:

with regard to installed capacity and generation of each technology, together with the electricity

demand outputs obtained from the TIMES-Sinergia model, they have been assessed by the REE model. Subsequently, the outputs of this model have determined the operating requirements of the conventional power park and technologies, subsequently integrating the results into TIMES-Sinergia. With this exercise, the technical restrictions included in the specific electricity generation model are incorporated into the general model of the Aco energy system.

8.1.1. Model TIMES-Sinergia

The*Integrated MARKAL-EFOM System (TIMES) tool was used to prepare the*NECP to carry out an analysis of the energy system and its prospectuAva. Times has been developed by the International Energy Agency under the ETSAP (*Energy Technology Systems Analysis Program*) programme for the development of energy and environmental analysis.

Times has been used to shape the energy system in more than 60 countries and is a widely used tool at European level, such as in Italy, Portugal, Finland or Norway.

In the case of Spain, the TIMES-Spain model was developed by the Centro de InvesAgaciones Energía Acas, Environment and Technology (CIEMAT) on the basis of 2005.

The Subdirectorate-General for Prospectus and Energy Statistics (SGPEE), which reports to the State Secretariat for Energy of MITECO, has carried out the work necessary to use TIMES as a tool for prospecting and energy analysis in the preparation of the PNIEC, adapting TIMES-Spain. The new model has been named TIMES-Sinergia (Integrated System for Energy Study).

Times is an Apo *bo # om-up mathematical model generator*. This means that the model is part of each of the components of the energy system to subsequently obtain the data at an aggregated level. The TIMES model generator combines two complementary approaches, one technical and the other economic. It is based on the linear opmisation of the Aco energy system, seeking a solution under the principle of minimum cost.

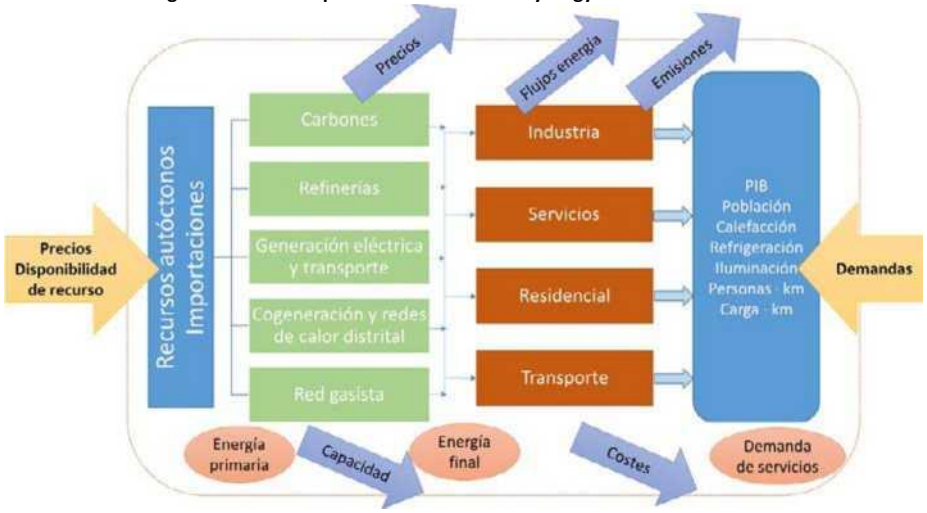
It has a detailed characterisation of energy technologies and energy service demands such as passenger-km for the transport sector, or production in tonnes for industrial sectors. For the various scenarios set out in the model, TIMES covers the demand for energy services by combining operational decisions and investment decisions, minimising the cost of the Aco energy system over the analysed horizon.

Some of the most relevant results of the model are the consumption and production of energy goods and services, flows, or prices and costs of energy goods. In addition, it provides GHG emissions and air pollutants, and is therefore suitable not only for the study of the energy system, but also in an integrated way for the analysis of environmental policies.

. ■ V I W i-la UVU

The figure shows the inputs and outputs of the TIMES-Sinergia model, which shows that, based on service demand parameters, energy prices and resource availability, the model determines the capacity to be installed, energy consumed, emissions and process prices.

Figure B.2 TIMES Input and Exit Scheme – Synergy



Source: International Energy Agency

Structure of the TIMES-Sinergia model

The uAliza model is a detailed database that allows the definition of the current and future energy system by modelling the various sectors related to energy consumption. The national energy structure is thus characterised by:

- Definition of base year. It includes all the variables, energy products and their energy flows for 2016. This introduces real historical data characterising the national energy system. This definition includes data on primary consumption, final consumption and processing sector. In addition, all existing technologies, with their characteristics, are modelled on each and every economic sector, electricity generation, industry, transport, residential, services, agriculture and others.

- Demand projections. In addition, future demands for energy services, prices and products of the input variables of the model are included. These data enable future scenarios to be implemented for further energy analysis.

- Theparameters characterising existing and future technologies are their efficiency; uAlisation factor, which reflects the average hours of use of each technology in relation to the annual total; the existing park; Ual-life; and investment, operation and maintenance costs.

- New technologies and processes. The model also considers Antas alternaAvas to replace future demands. To this end, a comprehensive database including a portfolio of future technologies is available. These new technologies will enter the

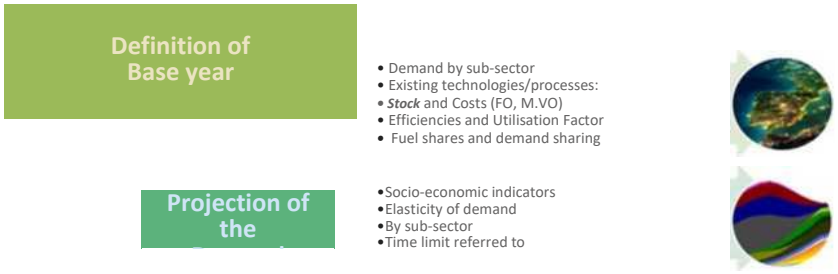
energy system, involving existing technologies at the end of their life, or through the implementation of other environmental or technical scenarios for the purpose of raising them.

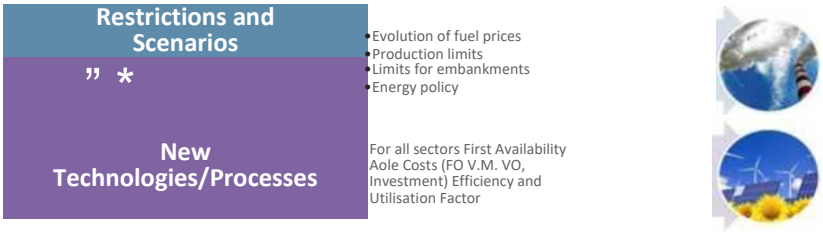
- Restrictions. They make it possible to incorporate the effect of policies and measures into the model.
environmental or quantitative restrictions, as well as other constraints on projections.

- Scenarios. They allow instant discs of the energy system to be represented for further analysis. By studying the scenarios, it will be possible to analyse the changes in future developments and to assess the influence of the adopted energy policy issues.

At the same time, a diagram can be seen with the TIMES-Sinergia data structure.

Figura 8.3. TIMES-Sinergia data structure





Source: International Energy Agency

The following figure shows the various parameters that characterise the technologies.

Figura 8.4. Parameters characterising technologies in TIMES-Sinergia

Source: International Energy Agency

Two scenarios have been considered in TIMES-Sinergia: the reference energy system or baseline scenario and the Subject Scenario. The baseline scenario sets out the evolution of the national energy sector in the event that the policies and measures proposed in the NECP are not implemented. The Subject Scenario presents the same evolution, but in the case of compliance with the policies and measures proposed to achieve the Objectives.

General modelling

Spatial and temporal resolution in TIMES-Sinergia

The TIMES-Sinergia model consists of a single region, corresponding to Spain. The analysed horizon is part of 2016, defined as the base year. In addition, the historical data for 2017, 2022, 2019, 2020 and 2021 are used to calibrate the model. In this financial year, 2024, 2023, 2025 and 2030 have been included in the model in order to make the projections.

Times Sinergia reflects the variability of demands over the year and day by means of '*Time Slices*', thus making it possible to simulate the form of electricity demand as well as renewable energy production curves. These time periods correspond to the different seasons of the year (spring-R, Verano-S, otoño-F, invierno- W). Each station consists of one day representing Avo for the whole period of 24 values, each value being one hour of the day corresponding to Avo. In this case, a specific day belonging to the full profile of each station is taken as a day representing Avo. The temporary representation in the model increases considerably compared to the one

used for the draft update of the 2023-2030 PNIEC delivered in June 2023, where each station was divided into only four sections: day (D), night (N), peak (P) and valley (V).

Thus, the time structure of each year is divided into ninety-six '*Time Slices*', representing each station with 24 hours. These temporary divisions are used both to shape the demands for energy technologies and to represent generation profiles. With the current time unbundling, the operation of renewable generation and storage technologies can be represented with fewer limitations compared to the previous unbundled unbundling in TIMES-Sinergia.

Taking as an example field R00 in Table B.2, given the temporal representation included in the model, that field would represent every hour of 0 of the 92 days of spring, just as field W06 would represent every hour of 6 out of 90 days of winter.

Given that there is still a limitation on the temporal representation of the model due to the computational cost involved in the size of the model, a model of linear hourly opmisation of the electricity system is used as a complement to analyse in detail the operation of generation technologies, especially the operation of storages and the integration of renewables. A description of the ualised models for the time analysis of the electricity system can be found in B.1.2 and B.1.3.

Table B.1 Time periods. Annual distribution

Stations	No of days	Fraction of year	DD/MM
R	92	0.25	21/03-20/06
S	92	0.25	21/06-20/09
F	91	0.25	21/09-20/12
W	90	0.25	21/12-20/03

Source: International Energy Agency

Table B.2 Time periods. Daily distribution of the number of hours

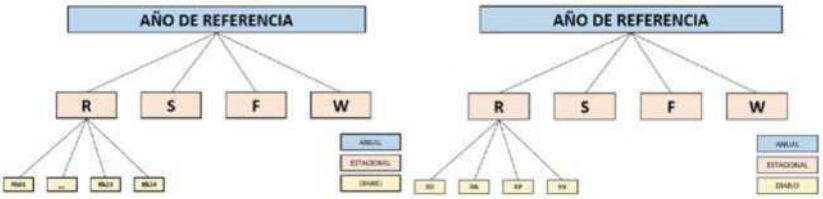
Time	Spring	Summer	Autumn	Winter
0	R00	S00	F00	W00
1	R01	S01	F01	W01
2	R02	S02	F02	W02
3	R03	S03	F03	W03
4	R04	S04	F04	W04
5	R05	S05	F05	W05
6	R06	S06	F06	W06
7	R07	S07	F07	W07
8	R08	S08	F08	W08
9	R09	S09	F09	W09
10	R10	S10	F10	W10
11	R11	S11	F11	W11
12	R12	S12	F12	W12
13	R13	S13	F13	W13
14	R14	S14	F14	W14
15	R15	S15	F15	W15
16	R16	S16	F16	W16
17	R17	S17	F17	W17
18	R18	S18	F18	W18
19	R19	S19	F19	W19
20	R20	S20	F20	W20
21	R21	S21	F21	W21
22	R22	S22	F22	W22
23	R23	S23	F23	W23

Source: International Energy Agency

On Annulment, we can see a graph showing the time-disaggregation diagram in the Ualised TIMES-Sinergia for the delivery of the draft PNIEC 2023-2030 (16 'Time Slices') and the current

disaggregation (96 'Time Slices').

Table B.3 Time periods. Diagrams for 96 and 16 "Time Slices"



Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Determination of the day represents: vo per station in TIMES-Sinergia

Modelling systems with high penetration of intermittent and non-gesAonable renewables requires the highest possible level of detail, so that their variability is properly captured, as they will also affect all other baseload and flexibility technologies (Poncelet et al., 2015). Therefore, given the impossibility of simulating the TIMES-Sinergia model with hourly resolution throughout the time horizon, there is a need to adapt the generation and demand profiles to the defined time resolution (96TS), which will directly influence the behaviour of all modelled technologies.

Therefore, a profile that represents as faithfully as possible all the information contained in the original profiles should be chosen or generated, as reducing the time resolution results in filtering in practice, with the consequent loss of information. There are different approaches to choosing the value of each Time Slice and, where appropriate, generating a representative profitAvo, so that the choice of these profiles will have a significant impact on the results of the model. Moreover, there is also no general criterion for assessing the validity of the selected profiles.

The techniques for choosing a representative profitAvo can be grouped into two main blocks: heurisProcessing techniques and ophthanisation techniques. The use of heurisTechniques starts from the assumption that, throughout an annual profile, musicians are available on days with similar characteristics, so that clustering or clustering algorithms are often used to form groups of different days representing Aves with similar characteristics within the same group but different between groups, thus capturing the variability of sources. This reduces the original profile to a set of representative profiles that should be able to replicate the main situations that can occur throughout the original time horizon, such as high and low demand events. The second group of techniques:

. ■ V I W i-la UVU

opAmisation, allows you to choose the best profile that meets the characteristics defined in advance by the modeler. To this end, there are different characteristics of the signals on the basis of which it is possible to define the selection criterion or function objected to by opAmizar. For static aspects this may be the mean value or probability of distribution of the profile. In dynamic aspects, greater emphasis can be placed on short- or long-term dynamics. It is even possible to define a correlation indicator between different profiles, such as between renewable technologies such as wind and solar producble profiles, or demand profiles of certain

technologies.

For the selection of profiles of the TIMES-Sinergia model in the 96 Time Slices configuration, the 'Time-slice to capture intermittent renewables characteristics' tool200, developed under the International Energy Agency's Energy Technology Systems Analysis (ETSAP) Technology Collaboration Programme (TCP), has been used. It is an opmisation tool based on mixed linear programming (MILP). Thus, the tool selects one day representing each station for each renewable profile and for electricity consumption.

ES: Increase of emissions

Emissions from the energy sectors, both from the combat (CRF 1A) and fugive emissions (acAvidad CRF 1B), as well as emissions from industrial processes (acAvidades CRF 2A, B and C), have been made using the projected aircraft variables as a result of the scenarios generated by the TIMES- Synergy model.

In addition, the emissions from the other non-energy sectors (agriculture (CRF 3), waste (CRF 5) and product use (CRF 2d-2h)) and emissions and removals linked to land use, land use change and forests (LULUCF-CRF 4) have been projected, on a case-by-case basis, according to national forecasts of the main Alevance variables for each sector.

On the projections of the Adult variables, the emissions and, where applicable, removals for each of the GHGs have been skewed by applying calculation methodologies similar to those implemented in the National Emissions Inventory and consistent with the international methodological guidelines. The 2023 edition of the National Inventory of Greenhouse Gas Emissions, corresponding to the 1990-2021 series, has been used as a reference for the calculation of projected emissions.

The projected emission calculations have been carried out jointly and consistently for both GHGs (CO_2, CH_4, N_2O and F-gases) and associated air pollutant emissions (NH_3, NMVOC, PM2,5, SO_2 and NO_x) that are included in the National Air Pollution Control Programme.

ANNEX B. **FORMS**

The base year for the projected series is the 2021 reporting year. The uAlised geographical coverage has been unique for the whole of the national territory, assuming characteristics and average parameters. Historical data from the National Emissions Inventory (1990-2021) have been used to analyse emission trends and emission factors (direct and implicit). The projected time horizon was 2022-2030 with annual time periods. Reference methodological guidelines have been used, as in the National Emissions Inventory, IPCC Guidelines 2006 and EMEP/EEA 2019 Metological Guides.

Torque data: da and macroeconomic assumptions

The database underpinning the TIMES-Sinergia model is based on a variety of sources. For historical data, energy variables are based on the energy balances published by Eurostat, which in turn are produced on the basis of the data provided by the national statistical system. For its part, in the data on historical energy production and consumption in the industrial sector, statistics from the General State Administration have been used and available in the Spanish Emissions Inventory System.

200 Time-slice tool for Capturing the CharacterisMcs of intermiuent renewables

In addition, in order to design future scenarios, projections are made of the demand for end-use energy services. This is done on the basis of macroeconomic variables such as GDP, GDP per capita or number of households, determining the elasAcity or relation of energy service demands with these macroeconomic variables. On the basis of GDP growth projections, the model's input values for future demand for energy services are determined, taking into account both the evolution of macroeconomic variables and the elascities of these with demand.

The prices of CO_2 allowances subject to the201 European ETS system and of the main energy carriers (coal, gas and crude oil) are those recommended by the European Commission for the development of the Plans.

Sectoral modelling

Times represents each of the energy-consuming sectors, aggregating their demands, to determine primary and final energy needs, and to characterise electricity generation demands and production needs of the energy transformation sector.

Residential, services and other sectors

The residential, services and other sectors include the coverage of the demands of the residential sector, which includes energy needs in the field of Aco, and the service and other sectors, which includes the demands for energy services originating from buildings with public and private economic capacity (commercial, health, public, workplaces;

. ■ V I W i-la UVU

among others), as well as the other sector, which represents the economic activity sectors not included in the other TIMES-Sinergia disaggregations, and which is modelled on an aggregate basis.

The residential and service sectors decompose their energy service demands according to final energy uses, including the demand categories for heating, cooling, lighting, hot water, kitchens and various electrical and electronic equipment (white line, brown line and others specific to the use of each building). In addition, public lighting demands are included.

For the residential sector, three flats of dwellings are included: single-family dwelling, multi-family dwelling with collecting systems for heating or domestic hot water and multi-family dwellings with individual heating or domestic hot water systems. There is also a difference between existing and newly built or renovated dwellings. This reflects the differences in energy consumption patterns for the building issues considered, as well as the diversity of technologies installed in each Apology.

In the case of the service sector, no disclaimer is made according to the Building Apo or Use. Modelled technologies are similar to those in the residential sector, albeit on a larger scale.

The technologies modelled in the residential and service sectors are detailed at Cancellation, classifying them according to the coverage of the corresponding energy service:

- **Fuel for heating Stoves, convectors, chimneys, solar panels and heat pumps have**been included. In turn, these technologies are divided according to the combusAble or energy

201HTA: Emissions Trading Scheme.

source used (coal, propane, diesel, gas, solar, electricity, geothermal, aerothermia, hydrothermia or renewable heat generation).

- **Cooling. Aerothermal, geothermal and hydrothermal heat pumps, absorption machines and solar cold have**been modelled.

- **ACS (Sanitary Quality Water). The model**comprises mixed boilers, heaters, heat heaters and heat pumps. There are different technologies in each Apo depending on the fuel or energy source used (coal, propane, diesel, gas, solar, electricity, geothermal, aerothermia, hydrothermia or renewable heat generation).

- **Lighting in buildings and street lighting. Incandescent, halogen, LED and fluorescent lamps**are used.

- **Cookers. In the residential sector,**it comprises technologies that operate on flammable discs (firewood, coal, gas, propane or butane and electricity). For its part, the services sector includes a generic technology called 'kitchen equipment', which includes a variety of equipment used in service kitchens, such as the kitchens themselves, but also ovens, Vaporeras, hot remittances, among others.

. ■ V I W i-la UVU

In addition, some technologies identified above simultaneously cover several energy service demands. This is the case for gas-fired boilers that are used for both heating and domestic hot water demands, such as heat pumps, which can be used for heating and cooling, and which could additionally replace domestic hot water demands.

Each of the technologies indicated is characterised by a set of parameters that are detailed in the Annulment. These parameters shape the energy performance of these parameters:

- **Efficiency**. Its evolution throughout the Aempo is defined by learning curves in such a way that efficiency gains paths are considered over the periods considered.

- **The availability factor**, given by a raAo reflecting the average hours of use of each technology out of the annual total.

- The **existing park** characterising the number of units of each technology.

- The **life u $l** of each technology.

- **Costs.** It includes both **investment costs for** new technologies, as well as **operational and maintenance** costs for new and existing technologies.

In addition to the above, in the residential sector, equipment falling within the categories of white line and brown line has been modelled in an aggregated manner. Similarly, this approximation has been carried out for other own uses associated with the use of the building in the service sector.

The data and scenarios for stopping the residential sector, services and others with a greater impact on the results of the model stem from the change in the number of households, both existing and newly constructed; or the area built in the services sector, whether existing or new

or reformed.

Transport sector

The transport sector is an energy-consuming sector that groups together the demands for mobility energy services, both for people and for goods. These demands for services are expressed in millions of passengers· km or million tonnes· km for the different modes of transport: road, rail, maryamo and air.

Within the TIMES-Sinergia model, different vehicle categories can be disguised to cover these energy service demands. Within these categories, each of the vehicles is differentiated according to the Apo de combusAble used by Aliza, which are gas.

. ■ V I W i-la UVU

electricity, diesel, gasoline, biocombusAbles, compressed or liquefied natural gas. In parAcular, the blending of biofuels with traditional fossil fuels has been considered.

A summary is given of the different types of vehicle according to the demand for energy services that Asfacen, covering both existing and future technologies:

- **Road traffic** It includes the various areas of transport of goods and persons:
  - **Passenger cars.** The demand is divided into short and long distances.
  - **Motorcycles and quadricycles. It is**assumed that they mainly contribute to short-distance demand.
  - **Buses. Urban and intercity buses have**been modelled.
  - **Heavy load (Tamions).** It includes vehicles of more than 3.5 tonnes covering the demand for freight transport.
  - **Light load (Furgonetas). It**includes vehicles of less than 3.5 tonnes of freight supported primarily for the carriage of goods over short distances (urban environment).
- **Rail transport.** Includes vehicles running on rails powered by electricity or diesel.
  - **Passenger trains. It**covers long and medium distance trains in addition to suburban trains.
  - **Freight trains.**
  - **Meters and trams.** All vehicles are electric and saAsfacen urban transport demand.
- **Transport in aviation and shipping.** Domestic aviation, international aviation and shipping demands are modelled in an aggregated manner. Energy in bunkers is also included.

The parameters that characterise the functioning of technologies in the transport sector are:

- **Efficiency**. Its evolution throughout the Aempo is defined by learning curves in such a way

that efficiency gains paths are considered over the periods considered.

- **The availability factor**, given by a raAo reflecting the average hours of use of each technology out of the annual total.
- The **factor of ac $,** which indicates the occupancy rate of the vehicle, in terms of tonnes for goods and/or persons vehicles.
- The **existing park** characterising the number of units of each technology.
- The **life u $l** of each technology.

. ■ V I W i-la UVU

- **Costs.** It includes both **investment costs for** new technologies, as well as **operational and maintenance** costs for new and existing technologies.

The data and scenarios for stopping the transport sector that have the greatest impact on the results of the model are the penetration of new technologies, especially those using alternaAves combusAvos, as well as the biocombusAbles mix in the transport sector.

Industrial Sector

In this sector, the final use energy demand for production in qsic units (tonnes) of industrial products is determined. To this end, it has been divided into relevant sub-sectors in terms of consumption, for which both the technologies used in industrial processes and the demands related to each of these processes, be they heat or electrical demand, are included. Industrial production is an entry into the model determined by the evolution of GDP. This macroeconomic parameter and the elasAcity that links it to industrial production determine the sectoral production.

The sectors considered for individual modelling are:

- Iron and Steel:
- Aluminium, copper and other non-ferrous metals.
- Ammonia, chlorine and other chemicals.
- Cement, lime, glass and other non-metallic minerals.
- Paper.

In addition, for the other industrial sectors, an aggregated modelling is carried out, including the economic activities of the industrial sector not included in the above classifications.

Cogeneration has been included in this sector, providing end-use energy for both thermal and electric uses. It includes various technologies according to the energy source uAlizan, including coal, refinery gas, fuel oil, natural gas, biomass, waste and biogas.

Each of the technologies indicated is characterised by a number of parameters that are detailed in accordance with:

- **RA $of production.** They indicate the relationship between production of qsic units and

energy consumed.

- The **existing park.**
- **Percentages of consumption of Combus $. They**are used in the case of technologies that can consume flammable Antos.

. ■ V I W i-la UVU

- **Investment, operation and maintenance costs.**
- **Life u $l**.
- **Electrical and thermal** efficiency.
- Distribution**coefficient between the energy see $gives the grid and the heat produced**, for cogenerations.
- **The availability factor**, given by a raAo reflecting the average hours of use of each technology out of the annual total.

The most relevant shutdown data and assumptions for the industrial sector are related to the evolution of production and uAlised industrial processes.

Agriculture sector

Includes agriculture, livestock, forestry and fisheries. The sector is included in the model in an aggregated form, characterised by its energy consumption profile for combat discs and spent energy. In these sectors only their behaviour as energy consumers is modelled.

Primary energy sector, transformations and exchanges

The primary energy, transformations and exchanges sector, unlike the sectors described above, represents the energy transformations needed to convert primary energy into final energy, i.e. it represents part of the energy transformation sector, excluding the electricity generation sector that is modelled in detail and described in the following heading. The sector comprises primary production, i.e. extraction of combusAbles, crude oil, natural gas and coal (coal, anthracite and lignite), as well as potential for the generation of national renewable sources: biomass, waste, waste heat, hydro, wind, solar and geothermal energy.

In addition to this, the industries associated with the energy transformation or secondary energy production of coke ovens, refineries, biofuel production and electric energy transport are taken into account.

In addition, in order to source primary energy, the system considers supply by imports of combusAbles. Similarly, exports made by the region are included.

Power generation sector

The model is based on the existing generation fleet in base year 2016 and saAsface the electricity demand of the other sectors, looking for the economic optim of the overall Aco energy system

on the relevant horizon. To this end, install new generation capacity if necessary,

. ■ V I W i-la UVU

taking into account all the operational costs and characteristics related to the different technologies considered.

Existing and new generating technologies have been modelled, defining their characteristics: the operating profile, maximum annual operating hours, efficiency, investment costs, operating and maintenance costs, lifetime of technologies, combustion costs, distribution of battles by technology, consumption in ancillary systems, emission costs, as well as their evolution over the relevant horizon.

It should be noted that in TIMES-Sinergia the electricity system is modelled as a single node system, including non-peninsular territories, although account is taken of the losses inherent in the transport and distribution network, as well as the different cross-border connections and their expected increase in capacity.

At the same time, it is necessary to establish a series of contours, mainly relating to the characteristics and functioning of generation technologies, thereby seeking to bring the model's behaviour closer to reality.

We considered a number of existing generation technologies in the base year (2016), as well as a series of new technologies, which would be those that would come into service in 2016.

The existing technologies considered are classified as:

- Conventional generation facilities:
  - Nuclear
  - Coal
  - Combined Gas Cycle
  - Fuel/Gas (non-peninsular territories)
  - Urban solid waste (RSU) (half of the generation of this technology is considered renewable, due to the biodegradable fraction of MSW)
- Renewable energy generation and pumping installations:
  - Biomass
  - Biogas
  - Thermoelectric Solar
  - Solar Photovoltaic
  - Wind (terrestrial and marine)
  - Hydraulic

. ■ V I i-el k uv v

- Hydraulic pumping facilities
- Urban solid waste (RSU) (half of the generation of this technology is considered renewable, due to the biodegradable fraction of MSW)

With regard to the new technologies considered in the model, it has been assumed that these will be exclusively renewable energy generation and storage facilities. In addition to new installations (commissioned after 2016) of existing technologies, the following technologies, not present in the base year generation park, have been included:

- New renewable generation and storage technologies:
  - Thermoelectric Solar with more than 9 hours of storage
  - Batteries with 2 hours of storage
  - Offshore energy technologies
  - Geothermia

The parameters characterising power generation technologies are:

Operating profiles

The different generation technologies Ahave a defined performance profile through the availability factor. It is therefore expressed by one and relates to the hours at which the technology is available for a period to the full hours of that period.

In TIMES-Sinergia, the availability factor indicated for each technology corresponds to an upper limit referring to the maximum operating hours of each technology during the period under consideration, therefore refers more to a maximum ualisation factor, rather than availability.

In TIMES-Sinergia, the following types of availability factors are defined:

- Annual availability factor: this annual factor, expressed by one, indicates the relationship between the maximum operating hours of the technology in one year and the total annual hours.
- Availability factor per period (*JME slice*): this factor per period, also expressed by one, indicates the relationship between the maximum operating hours of the technology in a given period and the total hours in the same period.

The definition of availability factors per time period is particularly relevant for renewable energy generation technologies, which will be more or less available according to the availability of the renewable resource itself.

. ■ V I i-el k uv v

as a source of energy. Thus, there will be technologies with lower availability in hours where electricity demand is high, and others, on the contrary, where the highest availability coincides with peak demand times, depending on the season of the year and the period considered.

In the case of conventional generation technologies, availability factors per period are usually constant, providing information, in this case, on the hours when the technology is no longer

available due to maintenance facilities, technical constraints, or other causes unrelated to the availability of the resource.

Efficiency

Data on the efficiency of thermal generation installations, both conventional and renewable energy, have been obtained from the data reported to Eurostat, which are considered to be constant over the whole horizon. Possible decreases in yield during this period are not taken into account. For technologies where more than one combouble is consumed, an efficiency is indicated for each combouAble.

For new technologies, not present in the base year generation park, the efficiencies provided by the *Joint Research Centre* (JRC) have been considered.

In the case of renewable generation technologies (solar photovoltaic, wind, hydro excluding pumping and offshore energy) an efficiency equal to 100 % has been considered.

Investment, operation and maintenance costs

Another parameter defining generation technologies is the cost, which in turn is divided into investment costs (only for new installations), fixed operating and maintenance costs and variable operating and maintenance costs, as well as their variation over the horizon. These costs do not include costs associated with taxes, tolls, combusAbles, etc.

Life u $l

The working life considered for renewable energy generation installations is that established in Order 1045/2014 of 16 June 2015 approving the remuneration parameters of Apo installations applicable to certain installations producing electricity from renewable energy sources, cogeneration and waste, with the following exceptions:

- For the new installed wind power, a lifetime of 25 years is considered for both onshore and marine installations.
- In the case of hydraulic installations, the extension of ual life over the entire horizon is considered.

. ■ V I i-el k uv v

For non-renewable technology installations, the following criteria have been taken into account:

- Nuclear: the baseline scenario considers the extent of the ual life of these plants over the entire horizon. The Target Scenario considers an orderly and progressive closure of the installed capacity of this technology.
- Coal: coal-fired power plants that have carried out the work necessary to adapt them to the European normaAva in terms of emissions by 2020 (around 4.53 GW) will operate AnuaAvas until 2030.
- Combined gas cycle: it is considered a single life of 40 years.
- Fuel/Gas (non-peninsular territories): The installed capacity of the fuel/gas plants in 2016 is considered to be halved in 2030.

With regard to the ual life and the decrease in generation capacity of the various technologies

present in the base year generation park (2016), in order to establish the closure of the installations in that power park, the date on which they were put into service has been taken into account, to reflect a decrease in capacity in line with their ual life. Thus, the capacity of the various existing technologies considered will be progressively reduced (depending on their putting into service), and will be triggered, if necessary, by the generation capacity of new technologies available in the system until 2016.

Consumption at generation

Consumption at generation represents the auxiliary consumption of the different technologies. These have been introduced into the TIMES-Sinergia model as a percentage of the total electrical energy produced by each technology Apo.

Transmission and distribution system losses

As noted above, the model simplifies the electricity system's grid, considering it as a single hub, although the efficiencies associated with the electricity system are established, allowing existing losses in the transmission and distribution of electricity in high-voltage, medium-voltage and low-voltage networks to be modelled, as well as losses associated with high to medium voltage and medium to low voltage transformation processes. These losses are modelled with efficiency coefficients associated with high (0,989), medium (0,974) and low voltage (0,916).

Interconnections

In TIMES-Sinergia, the following considerations have been taken into account to shape interconnections:

- Interconnections with Morocco and Andorra: a constant net export balance per time period, calculated as the average of the actual values for the years 2014, 2016, 2015 and 2017, is considered.

. ■ V I W i-la UVU

- Interconnections with Portugal and France: both import and export capacity with these countries have been considered together. As regards interconnection capacity with France, it should be noted that the planned increases in interconnection capacity have been taken into account, reaching 8.000 MW in 2030.

Penetration of renewable energy technologies

A cap on the input of new generation power for photovoltaic and wind (onshore and offshore) technologies over the period 2020-2030 is set.

Coupled thermal generation

A minimum of constant thermal generation is considered to be provided by all nuclear, coal-fired and combined-cycle power plants. In addition, part of this minimum will correspond to the sum of the productions of combined-cycle power plants and coal, of which another part will be provided exclusively by combined-cycle power plants.

Calculation of availability factors

The availability factors, both annual and over time, have been calculated, for existing renewable technologies, on the basis of actual hourly production data for each technology. The availability

factors for 2014 were obtained from the actual hourly production data for that year, whereas for subsequent years an average of 2014, 2015, 2016 and 2017 is assumed, and for hydraulic technology the data for 2015, which is considered to be one year close to an average hydraulic year, is assumed.

In hydraulic installations with a power of more than 10 MW and pumping facilities, these factors have been increased for periods, with the aim of increasing the capacity of these technologies to adapt to the various generation parks in subsequent years.

For the other technologies, annual AFA issues have been considered, adapted to the actual availability of each technology resulting from recharging stops, maintenance, unscheduled outages, etc.

Repowering

It is considered that the capacity of wind, solar photovoltaic, solar thermoelectric, biomass, biogas and municipal solid waste technologies, reaching the end of their life Uh will be repowered to a greater or lesser degree depending on the technologies.

Bibliography

Poncelet, K., Höschle, H., Delarue, E., de'Haeseleer, W. (2015). Selecvng representative days for investment planning models. *KU Leuven*.

B.1.2 Model endorsed by Red Eléctrica de España

Methodology

The analysis of the scenarios defined for the Spanish electricity system consists of the simulation of the generation dispatch and the supply chain for the adequacy analysis in the Spanish mainland electricity system, under the assumptions described in Annex D.

For the purpose of this analysis, there has been a halt to a European-level model that has been used as part of ENTSO-E. This model is the basis for both the energy balance studies and the probabilistic coverage studies included in this Annex D.

The model considers the pan-European perimeter and neighbouring areas connected to the European electricity system. The pan-European perimeter is explicitly modelled, while neighbouring areas

they can be modelled explicitly or not explicitly. Those explicitly modelled are represented by market nodes that consider complete information uAlising the best available resolution of input data and for which the Unit Commitment's Economic Dispatch (UCED) problem is resolved. For areas not explicitly modelled, exogenous fixed energy exchanges are applied with explicitly modelled areas.

The graph below shows the countries that have been explicitly modelled, in blue, those neighbouring countries that have been implicitly modelled, i.e. via fixed (green) exchanges and non-modelled countries (orange).

Figure B.5 European environment considered. Source: ENTSO-E

Source: Red Eléctrica de España

A simplified model of the system is used in which the Degree Systems (bidding zones) are represented as a network of knots interconnected by the commercial capacity available to the market (NTC – Net Transfer Capacity) depending on the

. ■ V I W i-la UVU

quasic interconnections that exist between each of them. In general, the uAliza model is the hourly values of trading capacity (NTC) between the modelled systems.

This is equivalent to the fact that within each bidding zone the calculation of the generation dispatch considers a single node, i.e. any limitations on generation due to elements of the internal network of each system are not taken into account. It is important to stress that this assumes in the model that the transmission network of the Spanish mainland system will have sufficient capacity to evacuate the entire modelled generation and transport it to the consumption points and that the electricity system variables are kept within the ranges established by the NormaAva to achieve the level of safety required by the latter. This will require the development and adaptation of such a grid to minimise balancing surpluses of

renewable generation202 or potential additional needs for thermal generation due to possible internal grid constraints, so that only a reasonable minimum of possible distortions to this single node assumption is introduced.

The simulations uAlise as the basis for a perfect market for competition in electricity generation and therefore do not include the potential supply strategies of generators: the supply of each generator is equal to its variable cost esAmado and the generation dispatch is obtained by minimising the variable generation cost in the European system as a whole under the condition of supplying electricity demand in all systems over the analysed time horizon.

Variable generation cost values are based on predicted fuel prices, esAmated operating and maintenance costs for each technology and CO2 emission$_{costs}$. They are not considered to be fixed generation costs, decommissioning costs of groups currently in service and not taken into account in the scenario to be assessed, possible costs of ubiquitous lifetime of generating groups or other factors (tolls, taxes) that may influence generation's supply strategy.

Cogeneration, renewable generation and in general all non-gesAonable generation are considered to be at zero variable cost, which gives them priority dispatch over other conventional thermal generation technologies.

For the purpose of calculating the generation dispatch, each conventional thermal generation unit is modelled with its operating parameters, its availability and accidental failure rates. Hydropower generation is modelled consistently with historical production series and wind, photovoltaic and thermosolar generation uAlising historical primary resource weather series. Similarly, cogeneration and other generations are modelled on historical data.

For each horizon, a full simulation of the European system's generation dispatch is carried out for one year with hourly granularity respecting all restrictions of the

. ■ V I W i-la UVU

groups (starting, stopping, raising and lowering load, must run, reservoir levels, minimum/maximum hydraulic power, etc.) to the Aempo that the total variable cost is minimised. The simulations implement a restriction on the thermal generation coupled in the Spanish Peninsular Electrical System (SEPE) with a minimum value sufficient to safeguard the dynamic stability of the electricity system. This minimum generation required corresponds to the generation of 3 nuclear groups and 7 combined cycle groups to the technical minimum for the scenario with horizon 2030.

For this analysis, minimum frequency/power control reserves have been included in all European countries.

As a result, the values of energy generated by each thermal unit and modelled generation technology, marginal cost values, the exchange balance and other variables, such as non-delivered energy, if any, resulting from the system's total variable cost minimisation process respecting the exchange capacity values and the other restrictions imposed on the model, are

Refers to surplus renewable generation that cannot202 be integrated into the system in the production or balancing markets. These surpluses are caused by possible overloads in the networks, which are resolved by the application of the mechanism of technical restrictions in the transmission system or in the distribution system.

obtained in detail at the time. It is very important to note that cost results should not be interpreted as prices and that the results obtained from the exchange of energy between interconnected systems are only the result of the marginal cost difference between those systems with the limitation of the value of trading capacity considered in the scenario.

UAlising these results, we calculate the generation balance and indicators of interest, such as the total value of renewable generation and the fraction it represents of electricity generation and demand in the Spanish mainland system, in order to obtain renewable penetration percentage values.

Adaptation of the scenarios defined by MITECO to the Europe-wide model

The European framework is the one set out in the European models in the field of ENTSO-E.

The inclusion in the European model of each scenario proposed by MITECO for the Spanish electricity system requires the adaptation of demand-side scenarios, renewable generation profiles, installed generation capacity of each technology and its dispatching characteristics to determine the values corresponding to the scope of the Spanish mainland electricity system, as well as the conversion of the power values to net values. The scenarios obtained represent the scenario that is now called the adapted mainland scenario.

In addition, the European scenario also modifies the cost scenarios for combusAbles, which correspond to those used in this Plan. These new variable costs apply both to Spain and to the entire generation fleet considered in the Europe-wide model.

The set of assumptions described above states the basis for calculating the unit variable cost of electricity generation for each generation technology for the determination of the

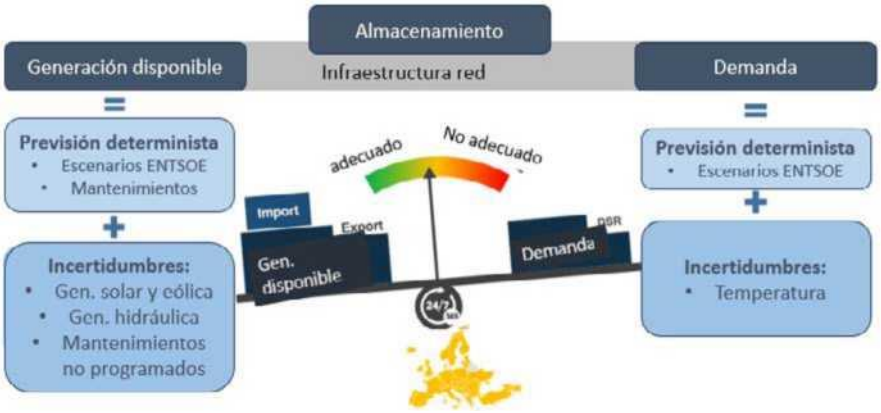
. ■ V I W i-la UVU

balance of resulting generation, and of energy not supplied, if any, in order to minimise the cost of the system to the Aempo that the restrictions imposed on the model are respected.

Adequacy assessment

The same model (similar to the ERAA (European Resource Adequacy Assessment) methodology for the production of generation balances is used for the adequacy assessment, although the model is paralysed to represent a set of weather years, in accordance with the probabilistic methodology.

Figure B.6 Overview of the methodological approach of the ERAA. Source: ENTSO-E production



The results of probabilist studies depend on a number of variables which can be considered independent of each other, notably the unavailability of interconnections between neighbouring systems and the unavailability of the generating groups, and other climate-dependent variables, and which therefore cannot be considered or modelled as independent of each other, mainly demand values and hydropower, photovoltaic and wind production capacities.

The stochastic immersion dependent on the Acas variables is modelled by a set of climate-related years used in ENTSO-E within the scope of the ERAA.

Figure B.7 ERAA probabilistic methodology

. ■ V I W i-la UVU

The indicators selected for analysis and further details are set out in Annex D.

Simulation tool

For the purposes of carrying out the simulations described in the previous paragraphs, the suite of plexed electrical systems simulation souware has been used. The plexos tool, developed *by Energy* Exemplar, is a package of electrical system modelling souware. It integrates an electricity

market modelling engine consisting of opting for the overall generation cost to determine the Optical Ama solution to economic dispatch to meet demand, taking into account exchange capacities between nodes or areas, considering these capacities as technical system constraints, and may incorporate additional constraints as minimal synchronous generation scenarios.

Plexos also includes a demand adequacy analysis tool to identify the demand adequacy needs of the system using probabilistic methodology. This tool allows the simulation of a large number of climate years and situations of planned unavailability or onset of generation using the Monte Carlo method. The use of this tool for the adequacy and economic dispatching analyses of the electricity system is based on the following factors:

- Linear opmisation systems. Plexos is capable of linearising the economic dispatch problem in order to always obtain a valid solution. Its calculation systems are robust and robust; however, they require high computation powers. In any event, they maintain a high consistency in the solutions.

- Plexos has the capacity to incorporate complex restrictions in the problem of opmisation of generation costs in economic dispatching studies. These restrictions may shape possible technical constraints in the system (overload, minimum coupled generation, reserves, etc.) or restrictions on generators, at their generation limits or on their offers to the market, allowing for the modelling of complex offers. In this way, plexos allows power systems to be modelled in great detail and precision.

. ■ V I W i-la UVU

- The capacity of plexes to carry out hydraulic/thermal coordination in the economic dispatch allows complex studies to be carried out to minimise the costs of thermal generation through hydraulic generation or the oppressed gesAon of storage resources (pumping, battery or other). This resource is important for economic dispatching and demand coverage analyses for the Spanish mainland electricity system.

B.1.3 Linear opmisation model for electricity system operation analysis

In order to carry out a time analysis of the operation of the different technologies that make up the electricity generation system included in the TIMES-Sinergia model for 2025 and 2030, a linear opmisation model developed by the InsAtuto de InvesAgación Tecnológica (IIT) called OpenTEPES (Open GeneraAon and Transmission OperaAon and Expansion Planning Model for Renewable with RES and ESS) has been established. This model has been adapted and fed by the Subdirectorate-General for Prospectus and Energy Statistics. The model determines the electricity supply at the lowest possible cost to cover the electricity demand of the system on an hourly basis. Since the model has been used to obtain an optical result of the system operation, the variable operating and maintenance costs, combustion costs and emission costs have been taken into account, excluding fixed operating and maintenance and investment costs, which are included in the TIMES-Sinergia model.

The necessary constraints associated with the safety of the electricity system have been included within the model, including a minimum synchronous generation for each hour of the year, in line with the EER model.

In order to maintain the integrity of the modelling of the whole energy system, the hourly model has been fed with the data provided by the TIMES-Sinergia model for the electricity system, including the final consumption of electric energy and the installed capacity of each technology, including the ualised electrolysers for the production of hydrogen from renewable electricity.

The OpenTEPES model only simulates the national electricity system at the single node, taking into account the interconnections with neighbouring countries, including the hourly data calculated by REE using the plexos model, which coincides with the same TIMES-Sinergia scenario. In addition, the ENTSO-E European Resource Adequacy Assessment has been used to build renewable resource profiles.

The results of the model make it possible to examine, on an hourly basis, technical elements of the analysed electricity system, such as verAdos in renewable generation, generation not served if any, the electricity consumption profile of electrolysers or the charging and unloading cycles of storage systems. The hourly analysis of the electricity system obtained in TIMES-Sinergia brings consistency to the calculated long-term energy projections.

. ■ V I i-el k uv v

The detailed documentation of the OpenTEPES model developed by the IIT can be found on its website203.

8.2. NON-ENERGY EMISSION MODELS

8.2.1. Projections for the non-energy sectors

Introduction

In addition to the modelling of the energy system for the 2021-2030 NECP, carried out using the TIMES-Sinergia model (see Annex B.1.1), the emissions from the other non-energy sectors and LULUCF emissions and removals have been projected, on a case-by-case basis, according to national forecasts of the main aircraft variables representing Aves in each sector.

On the projections of the Adult variables, the emissions and, where applicable, removals for each of the GHGs have been scanned using calculation methodologies consistent with those implemented in the National Emissions Inventory (IPCC Guidelines 2006 and EMEP/EEA 2019 Metoological Guides). The 2023 edition of the National Inventory of Greenhouse Gas Emissions, corresponding to the 1990-2021 series, has been used as a reference for the calculation of projected emissions.

The base year for the projected series is the 2021 reporting year. The uAlised geographical coverage has been unique for the whole of the national territory, assuming characteristics and average parameters. Historical data from the National Emissions Inventory (1990-2021) have been used to analyse emission trends and emission factors (direct and implicit). The projected time horizon was 2022-2030 with annual time periods.

The projected emission calculations have been carried out jointly and consistently for both GHGs (CO_2, CH_4, N_2O and F-gases) and associated air pollutant emissions (NH_3, NMVOC, PM2,5, SO_2

203 openTEPES: Open GeneraMon and Transmission OperaMon and Expansion Planning Model with RES and ESS | InsMtuto de InvesMgación Technology (IIT) (comillas.edu)

and NO_x) that are included in the National Air Pollution Control Programme.

In addition, the main characteristics of the emission projections calculation systems for the most relevant non-energy sectors are briefly described: agriculture, waste, product use and land use, land use change and forests (LULUCF).

Projections for the agriculture sector

The calculation system applied in the 2023 edition of the edition of the National Inventory of Greenhouse Gas Emissions, corresponding to the 1990-2021 series and based on the Guides, has been calculated consistently with the projected emissions from the agriculture sector.

. ■ V I W i-la UVU

IPCC 2006 and EMEP/EEA 2019 Methodology through a Level 2 methodological approach based on country specific data. The base year for the projected series is the 2021 reporting year.

The two main sets of data input to the system taken into account in the projections are the livestock population and the consumption of inorganic ferrous plants on the surface of the crop.

The forecasts for the evolution of the livestock population for the beef, dairy, sheep, pig (white and Iberian), poultry, rabbits, goat and equine species for the projected period have been provided by MAPA on the basis of historical data and market forecasts for livestock production.

For each livestock population, in addition to the census data, parameters relating to enteric fermentation and to the country's own gesaon of manure have been taken into account for the esamation of projected emissions in a manner consistent with the National Emissions Inventory. These data are based on zootechnical documents with specific data for Spain for each species of production and current data and forecasts of gesAón systems. These calculations are carried out in a way that is coordinated and consistent with the esAmation of emissions resulting from the application of manure to the field as an organic fertiliser (sector CRF 3Da2a) and/or those derived from pastures (Avidad CRF 3Da3).

Both the total cultivated areas (including rice) and the total canopy and support of inorganic feralisers applied to the field as feralisers have been taken into account for the purpose of the projected emissions derived from the gesaon of cultivars (acAvidades CRF 3C, D, F, G and H). Within these practices, account has also been taken of the current state of implementation of best available techniques and their foreseeable future evolution. The cultivated area is consistent with the data listed in the Spanish National Inventory of Emissions, as well as the data on the use and application of inorganic ferotisers, which are in turn consistent with the National Nitrogen Balances in Spanish Agriculture (BNPAE).

For the scenario with additional measures, the policy areas and measures described in the relevant chapter of this report have been taken into account.

The projected emission calculations for all agricultural aircraft have been carried out jointly and consistently for both GHGs (CO_2, CH_4 and N_2O) and associated air pollutant emissions (NH_3, NMVOC, PM2,5, SO_2 and NO_x) that are included in the National Air Pollution Control Programme.

Projections for the Waste Sector

For the projection of emissions from gesAon and waste treatment, the historical inventory data have been used as stopping data (since 1950 for landfills and from 1990 for the rest of the Aids). These data are consistent with the

. ■ V I W i-la UVU

national official series (Subdirectorate-General for Circular Economy of MITECO and INE) and those published in EUROSTAT.

Forecasts of the evolution of total waste generation (acAvidades CRF 5A, B and C1), as well as the distribution of gesAon and treatment systems at national level for the baseline scenario have been provided by the competent unit of MITECO. For the scenario with additional measures, the policy areas and measures described in the relevant chapter of this report have been taken into account.

With regard to the emissions from waste water treatment (acAvidad CRF 5D), for the projection it has been linked to the projection of the national population, considering that Adult has reached maturity in terms of development (maximum percentages of treated population, volume of treated water, protein consumption, balance in treatment systems and maximum in the uptake efficiencies of CH_4 generated and its use).

The calculation of emissions has been done in a manner consistent with the methodologies used in the National Emissions Inventory (based on IPCC 2006 and EMEP/EEA 2019 Methodological Guidelines, usually with Level 2 methodological approaches).

Projections for the Product Use Sector

This sector mainly includes Aeroplanes linked to the use of lubricants and solvents (acAvidad CRF 2D) and the use of F-gases (acAvities CRF 2F and G).

The projection of the aircraft variables linked to the use of lubricants and solvents has been linked by elasCities to the projection of GDP and population determined in the overall macroeconomic context of the National Plan.

For emissions of fluorinated gases in refrigeration and air-conditioning aircraft, foaming agents, anfire equipment, according to the objectives of Regulation (EC) No UE/517/2014 on F-gases, which provides for a reduction in emissions from 2 010 in 2/3 in 2030 and sales of F-gases in 2014 by 79 % in 2030.

The variety of Aids covered by category CRF 2G (SF6 in electrical and medical equipment, N_2O in anaesthesia and aerosols for mounted cream) has been projected to link the acAvities directly to GDP.

Policies or measures beyond those currently in place have not been taken into account for the construction of the scenario with additional measures.

The projected emissions have been subdivided in a manner consistent with the methodologies used in the National Emissions Inventory (based on IPCC 2006 and EMEP/EEA 2019 Methodological Guidelines and typically Level 2 methodological approaches).

LULUCF projections

Projections of removals and emissions from the land use, land use change and forest sector (LULUCF) have been made using the same calculation model as used in the National Emissions Inventory in its 2023 edition (series 1990-2021 and reference year 2021). This calculation system applies IPCC methodological guidelines 2006 and makes use of data sets of area uses and changes available from 1970 to 2021.

The 2022 land use change matrices have been built on trends observed in historical data. Only additional surfaces have been incorporated into the reforestation for the construction of the scenario with additional measures according to the measures described in the relevant chapter of this report.

Forecasts for consumption and uAlisation of timber products have been based on historical inventory data linked to GDP. For the transitions between crops, the incidence of forest fires, the growth of forest biomass or the implementation of agricultural and forestry soil conservation practices (acAvities with a significant impact on the LULUCF calculations in the Spanish inventory), different forward-looking approaches have been applied based on historical data from the National Inventory and historical trends.

LULUCF removals have also been accounted for in accordance with Regulation (EU) 2018/841.

8.3. IMPACT ANALYSIS MODELS

8.3.1. DENIO model description

The DENIO model has been used in this study to analyse the economic impact of the different measures and scenarios in the PNIEC. DENIO is a neo keynesian dynamic econometricmodel and represents a hybrid between an econometric input-output model and a computable general equilibrium (CGE) model. It is characterised by the integration of the rigidities and uneconomic frictions that make fiscal policies and investments have a different impact in the short term than in the long term. In the long term, the economy always converges towards an equilibrium of full employment and, in that phase of equilibrium, the model works in a similar manner to a CGE model. Unlike a CGE model, DENIO explicitly describes an adjustment path towards that equilibrium.

DENIO is a disaggregated model with a breakdown of 74 sectors, 88 products, 22.000 household aphs and 16 consumption categories. The equations of the model have been spared econometric uAlising data from the INE, the Bank of Spain and EUROSTAT.

DENIO is inspired by the*Fully Interregional Dynamic Econometric Long-term Input-Output Model*of the European Commission (Kratena et al., 2013, Kratena et al. (2017). The FIDELIO model has been used by the European Commission to analyse the economic impact of the *Clean Air Package* (Arto et al., 2015). A model of these characteristics has also been used in the Basque Country (DERIO: *Dynamic Econometric Regional Input-Ouput model*) 81 to analyse the economic impact of the Basque Country's Climate Change Strategy 2050.

Economic growth in DENIO is in the long term driven by the growth in the total output of factors (TFP), which is a price path and thus compelling exports. Exports are exogenous and in line in the baseline scenario with the path of GDP growth provided by MINECO Imports are endogenous and there is no balancing condition on the external balance.

In DENIO, there are two mechanisms that determine the Keynesiana characteristic of the model in the short term and the characteristic CGE in the long term: (I) the heterogeneity of the marginal propensity to consumption relative to disposable income, depending on the situation of the financial sector and (ii) the effect on wages/prices when the economy is at or below the break-even unemployment rate (NAIRU). The marginal propensity to consumption also varies according to income group. This has been derived from long-term income sensitivity assumptions from consumption (Kratena, et al., 2017).

The household demand sub-model comprises three levels where demand is determined by 22.000 households for a total of 16 expenditure categories. The first level results in demand for durable goods (housing and vehicles) and total demand for non-durables. The second level links energy demand (in monetary and quantitative units) to the stock of durable goods (houses, vehicles, Acos), taking into account the energy efficiency of the stock. The third level identifies nine categories of demand for non-durable consumer goods in a flexible demand system (*Almost Ideal Demand System*). By way of example, the total expenditure made by households in these 16 consumer categories (at purchasers' prices) is transformed into a consumption vector of 88 products at basic prices uAlising a product/expenditure bridge matrix and the valuation matrices provided by the INE. The model is escorted uAlising micro-data from the Family Budget Survey and the Living Conditions Survey drawn up by the INE.

The Input-Output core of the model is based on tables of origin and departure drawn up by the INE. The production model links the production structures (LeonAef technologies) of the 74 sectors and 88 products to a Translog model with four production factors (capital, labour, energy and other intermediate inputs). The demand for the energy factor is divided into 25 apes which in turn link to the model in qsic units (Terajoules and tonnes of CO_2). The set of energy categories of the Energy Screening Model is directly linked to two parts of the model: (I) the quarterly energy accounts (Terajoules) by industry (74 + households) and Apo de energy (25) of EUROSTAT and (ii) the energy products and industries in the Origin and Destination tables in monetary units. To this end, an implicit price series linking energy uses/production in qsica (TJ) and monetary terms is used. The high level of detail of the energy model makes it possible to link the DENIO model with boäom-up models in the energy/electricity sector (such as TIMES-Sinergia).

The labour market is specified through wage curves, where wage increases by industry depend on production, consumer price index and distance to full employment. The demand for intermediate inputs is modelled in three steps. First, the Translog esAma model is the total demand for intermediates in each production sector. Secondly,

. ■ V I W i-la UVU

this demand is disaggregated by uAlising the production structures of the Input-Output framework's Origin Table. As a result, the intermediate demand is divided into domestic and

imported products. Capital formation is also endogenous and derives from the capital demand by sector of the Translog model, applying the product/sector capital formation matrix. The model is closed by endogeneisation of parts of public expenditure and investment to comply with the medium-term stability programme for public finances. That mechanism for closing the model forms part of the public sector module. This module integrates several endogenous income components: taxes on income (depending on the income of each household), wealth, capital, products and production, and social security contributions. Among the expenditure, transfers are endogenous and grow at the same rate as GDP. Interest payments on public debt are also endogenous and depend on the public debt path. Public consumption and investment are endogenous for the model closure described above.

For the PNIEC simulations, the DENIO model has been used in combination with the boäom-up TIMES-Sinergia model. Specifically, data such as the energy and electricity mix, energy intensity and efficiency by sector, prices and investments are taken from this model to analyse the economic impacts on key variables such as employment, GDP, trade balance, income distribution, inflation, etc.

Bibliography

Arto, I., Kratena, K., Amores, A.F., Temurshoev, U., Streicher, G. 2015. Market-based instruments to reduce air emissions from household heaAng appliances. Analysis of scrappage policy scenarios. European Com- mission, Joint Research Centre, InsAtute for ProspecAve Technological Studies. ISBN 978-92-79-50850-9.

Kratena, K., Streicher, G., Saloendeavour, S., Sommer, M., Valderas Jaramillo, J.M. 2017. FIDELIO 2: Overview and TheoreAcal foundaAons of the second version of the Fully Interregional Dynamic Econometric Long-term Input-Output model for the EU-27. European Commission, Joint Research Centre, InsAtute for ProspecAve Technological Studies. ISBN 978-92-79-66258-4.

Kratena, K., Streicher, G., Temurshoev, U., Amores, A.F., Arto, I., Mongelli, I., Neuwahl, F., Rueda-Cantuche, J.M., Andreoni, V. 2013. FIDELIO 1: Fully Interregional Dynamic Econometric Long-term Input-Output Model for the EU27. Luxembourg. European Commission. ISBN 978-92-79-30009-7.

8.3.2. Inclusion of microdata in DENIO

DENIO incorporates the microdata from households representing the whole Spanish population, which makes it possible to assess the microeconomic effects and distributional impacts and their impact at social level.

The main database used to integrate the 22.000 households into the model is the Household Budget Survey (SPF). The EPF is a cross-sectional survey representing Ava of the entire Spanish population, which gathers annual information on consumption patterns and the

socio-economic characteristics of Spanish households. Thus, the consumption structure of the EPF includes the households collected from this survey in DENIO. It should be pointed out that the Household Budget Survey contributes a population factor for each household surveyed. This population factor allows us to extrapolate the consumption of each household and thereby

produce an approximate analysis of all households in Spain.

However, as expected, the integration of microdata into a model of these characteristics is not immediate and it has been necessary to include data from other statistical sources, as well as some assumptions. One of the main limitations of the Household Budget Survey is its limited information about household incomes and their origin. Although the Household Budget Survey contains information on households' monthly income, this variable Aene is a high rate of non-response and as demonstrated by some studies it often underrepresents household income. (2016). Thus, in order to calculate the income of each household, the savings calculations calculated for Spain on the total expenditure of each household have been applied. The use of savings rates by income level has been chosen for two reasons. The first is that the Family Budget Surveys have been used to calculate them. The second reason is that household saving calculations are presented by different levels of income (quinAles, to be more specific). In this way, using the saving rates per quinAl of income in the SPF respects the existing inequality structure in Spain.

Finally, the source of household incomes introduced into the model has also been necessary. In DENIO, each household consumes according to the consumption structures of each consumption cluster, and depending on its disposable income. This disposable income depends on different sources of income. In DENIO, the following 8 sources of income are taken into account to calculate the disposable income of households: (1) wages and salaries; (2) gross operating surplus; (3) social contributions; (4) public sector transfers; (5) property rents and dividends; (6) interest paid on the debt; (7) taxes on wealth and personal income tax and (8) other income. As this information is not covered by the EPF, the source sources of household incomes have been supplemented uAlising information from the Living Conditions Survey (LSC). The ECV, like the EPF, is a cross-sectional survey representing Ava of the entire Spanish population whose main objection is to have a reference source on comparative statistics on income distribution and social exclusion at European level (INE 2018b).

In order to complement the sources of income in the EPF, the ECV 2014 revenue structure (taking into account the sources of income included in DENIO) has been calculated by income group, more specifically by income sales. Having calculated the average structure of the ECV's sources of income per sale, these same structures have been applied to EPF households in line with the income sales to which each household belongs.

The above process produced the following information for each household included: consumption patterns, total income, origin of such income and characteristic features set out in the Family Budget Survey. Thus, the 22.000

households ready to be integrated into DENIO are available. Finally, the data were added using the expenditure and income structures of the 22.000 households while respecting the values of the national accounts incorporated in DENIO.

Bibliography

INE (2018a). Annual Household Budget Survey, base 2006. InsAtuto Nacional de Estadística Aca. www.ine.es

INE (2018b). Living conditions survey, base 2013. InsAtuto Nacional de Estadística Aca. www.ine.es

Y Pez-Laborne, J., Marín-González, C. and Onrubia, J. (2016). What happened to consumption and savings in Spain during the Great Recession? A home-based analysis, Studies on the Spanish Economy, 2016/20, Fedea.

8.3.3. AIDS demand model specification

In order to specify the non-durable goods consumption node, a demand model has been set up to calculate the price elascities of suspicion, as well as the revenue elasAcities of the various goods that make up this node. These elasAcities are then used to apply the parameters corresponding to the demand function for non-durable goods. The widely known 'Casi Ideal Demand System' (AIDS), proposed in 1980 by Deaton and Muellbauer (1980), has been used to shape the demand model for these goods. The main advantage of this methodology is that it allows a first order approximation to an unknown demand system. Moreover, AIDS saAsfacen the axiomes of consumer theory and does not impose restrictions on the function of uality. More specifically, the logarithmic form (LAIDS) was used, which can be defined for a specific group of goods n as:

$$W_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln\left(\frac{Y}{P}\right) + \sum_k \delta_{ik} D_k + \varepsilon_i \qquad [1]$$

where W_i represents the percentage of consumption of good i (over the total consumption of the goods included), α_i is the constant, p_j is the price of good j, P. refers to the Stone Price Index, Y is the income (so Y /p. represents actual income), t is a trend variable capturing the effect of Aempo (taking values of 1 for 2006 and 11 for 2016). By UlAmo d_k is a set of "d" dummy variables or control variables that capture the effect of dysCharacteristics of households including: crisis years (meaning years post or pre 2008); autonomous Community of residence; professional status of main provider; number of members of the household; sex of the main carrier; age of main provider and proximity to urban centre. Finally, (ε_i) is the term 'error'. The additivity and homogeneity of the equation [1] are as follows:

$$\sum_{j=1}^{n} \gamma_{ij} = 0 \quad \forall i$$

$$\sum_{i=1}^{n} \alpha_i = 1 \qquad [2]$$

$$\sum_{i} \beta_i = 0$$

The symmetry condition is given as: [3]

$$\gamma_{ij} = \gamma_{ji}$$

[4]

[5]

Finally, the sum of W_i should also be saAsfacer that:

$$\sum_{i=1}^{n} W_i = 1 \qquad [6]$$

The AIDS model is carried out to analyse demand for non-durable goods, including 9 groups of non-durable goods: (1) food and beverages; (2) clothing and footwear; (3) household non-durable goods (furniture, carpets, tableware, etc.); (4) medical expenses; (5) telecommunications; (6) education; (7) hotels and restaurants; (8) financial services and (9) Other non-durable goods. As the AIDS model is composed of a system of dependent equations, the equation corresponding to group 9 has been removed in the esAmation process to avoid problems of uniqueness. The elasAcities matrix of the AIDS model has been calculated using the following expressions:

ElasAcidad Marshalliana precio-propia: $\varepsilon = \frac{\gamma_{ii}}{w_i} - \beta - 1$ [7]

ElasAcidad Marshalliana precio-cruzado: $\varepsilon_{ij} = \frac{\gamma_{ij}}{w_i} - \beta$ [8]

ElasAcidad de ingresos: $\theta_i = \frac{\beta_i}{w_i} + 1$ [9]

The data used in the esAmation process have been taken from the microdata of the Family Budget Survey (SPF) (INE, 2018). The EPF is a cross-sectional survey representing Ava of all Spanish households, which gathers annual information on consumption patterns and socio-economic characteristics of households. It collects annual information from some 20.000 households. For AIDS esAmation, EPF data for the period 2006-2016 have been used. One of the main limitations of the esAmation carried out is the lack of a connua household survey, as the SPF is a cross-sectional survey for each year, which is why cross-data for each of the years included in the esAmation have been used, i.e. the data have not been transformed into a connua time series. In the esAmation of equation [1], household expenditure is used as a proxy for income because household income is underrepresented in expenditure surveys (see e.g. Wadud et al., 2009, or de el pez-Laborta et al. 2018) and also because expenditure is a variable closer to permanent life income and suffers less change over the lifetime of individuals (Poterba, 1991). Given that the expenditure groups analysed consist of various goods and products, there is no specific price available in the national statistics for the selected groups, and it was therefore necessary to construct a price index by group on the basis of the consumer price indices (CPI, INE 2018) of each expenditure sub-group. To this end, a Stone Index has been constructed for

each expenditure group from the price indices by Autonomous Community based on 2006 for each sub-group. One of the main advantages of this process is that it makes it possible to introduce heterogeneity in the prices of each expenditure group and individual and thus facilitate the esAmation of the AIDS demand model.

The price and income elascities obtained are shown in Table B.4. The top column of the table represents the income elasAcities, while the rest represent the elasAcities of prices. The main diagonal (darker colour) of the matrix shows the price-own elasScities, while the remaining elements are cross-priced. As can be seen, and could be expected, the price-specific elasAcities Aare a negaAvo, while the income elasCities are positives.

Table B.4 ElasUcities price (own and cross-linked) and income elasUcities

	Feeding	TexFl	Black Hogar	Health	Communications	Education	Restoration	Financial services	Others	Income
Feeding	— 1.76	0.83	0.39	0.89	— 0.08	— 0.09	0.69	0.13	— 0.65	0.58
Tex0l	2.71	— 2.29	— 1.27	— 1.36	0.27	0.71	— 0.45	— 0.32	0.72	1.34
Black Hogar	1.30	— 1.73	— 0.23	— 1.45	0.78	0.17	— 1.42	0.23	1.19	1.30
Health	4.83	— 2.18	— 1.72	— 2.14	1.22	0.74	— 1.88	0.28	— 0.36	1.41
Communications	— 1.29	0.45	0.84	1.11	— 0.70	— 0.87	0.05	0.52	— 0.88	0.58
Education	— 5.99	4.58	0.83	2.89	— 3.94	— 1.92	1.84	1.23	— 0.63	1.89
Restoration	1.31	— 0.32	— 0.70	— 0.78	— 0.05	0.14	— 1.65	— 0.34	0.91	1.39
Financial services	— 0.07	— 0.36	0.25	0.26	0.47	0.28	— 0.58	— 0.59	— 0.51	0.74
Others	— 1.94	0.39	0.46	— 0.18	— 0.43	— 0.11	0.84	— 0.29	— 0.23	1.37

Source: Basque Centre for Climate Change, 2019

Bibliography

Deaton, A. and Muellbauer, J. (1980). An almost Ideal Demand System. American Economic Review, 70, 312 – 326.

Hills, J., 2012. Geãng the measure of fuel poverty. Final Report of the Fuel Poverty Review., CASE report 72. Centre for Analysis of Social Exclusion. The London School of Economics and PoliAcal Science., London, UK.

Y Pez-Laborne, J., Marín-González, C. and Onrubia, J. (2016). What happened to consumption and savings in Spain during the Great Recession? A home-based analysis, Studies on the Spanish Economy, 2016/20, Fedea.

Poterba, J.M. (1991). Is the Gasoline Tax Regressive? NaAonal Bureau of Economic Research.

. ■ V I W i-la UVU

Tyrado Herrero, S., Jiménez Meneses, L., López Fernández, J.L., Perero Van Hove, E., Irigoyen Hidalgo, V., Savary, P., (2016). Poverty, vulnerability and energy inequality Aca. New approaches to analysis. Association of Environmental Sciences, Madrid.

Tyrado Herrero, S., Jiménez Meneses, L., López Fernández, J.L., Perero Van Hove, E., Irigoyen Hidalgo, V., Savary, P., (2018). Energy poverty Aca in Spain. Towards a system of indicators and a state policy strategy. Association of Environmental Sciences, Madrid.

Wadud, Z., Graham, D. J. and Noland, R.B. (2009). Modelling fuel demand for differenteconomic partner groups, Applied Energy, 86, 2740 – 9.

8.3.4. Description of TM5-FASST

TM5-FASST is a global air quality 'fuente-receiver' Apo (AQ-SRM) developed by the European Commission's JRC in Ispra, Italy. It enables analysis of the effects on health or ecosystem damage resulting from different scenarios or emission paths. Through meteorological or chemical-atmospheric information, the model analyses how emissions from a given source affect the different receptors (in cells) in terms of concentration, exposure and, consequently, premature deaths. All the documentation on this model can be found in Van Dingenen et al., 2018. It has been used to carry out different studies at global or regional level, including (Kitous et al., 2017) or (Markandya et al., 2018). It has also been used by insAtutions such as the OECD to project potential health effects in the future (OECD, 2016).

The concentration levels of a given pollutant will be calculated using the following linear equation:

$$C_{ij}(x, y) = c_j(y) + A_{ij}(x, y)\, E_i(x) \quad (1)$$

This equation defines the concentration level of a pollutant j in the receiver/cell and derived from the emission of the precursor i emitted at source x (i.e. Cappendix ij (x, y)) as the sum of a spatial constant (cappendix j) plus the emission of precursor i at source x, multi-applied by a future-receptor coefficient (Aappendix ij (x, y)) reflecting the relationship between source **x** to receiver **and**.

These coefficients represent the different relationships between sources and receptors/cells. They were previously calculated by applying a perturbation to the emissions of 20 % in comparison with the reference scenario, and by calculating the concentration levels as equation (1) shows. The model covers the whole world in 1°x1° (~ 100 km) grid cells, nevertheless this process was conducted for 56 regions (sources). Therefore, each of these coefficients, for each receptor, can be defined by the following equation:

$$A_{ij}(x, y) = \text{el}\, C_j(y) \,/\, - e_i(x) \quad (2)$$

Where -$e_i(x) = 0.2\ \text{appendix}\ e_i(x)$, where $e_i(x)$ is the emissions in the baseline scenario.
Note that in addition to the fact that emitting gases at a certain source x may affect receivers and each precursor may also indirectly affect concentration levels of more than one pollutant j. For example, NO_x emissions (which is a gas)

. ■ V I W i-la UVU

precursor) affect not only the formation of PM2,5 parhcules in the atmosphere, but also influence ozone levels (O_3).

Therefore, the total concentration level of pollutant j in the receptor (cell) y, resulting from the emission of all its precursors i, at all sources x, is defined as:

$$C_j(x, y) = c_j(y) + y/\,\text{l}\, A_{ij}(x, y)\, [E_i(x) - e_i(x)] \quad (3)$$

Once the concentration levels of the contaminants have been obtained, the model makes it possible to analyse different effects resulting from those levels, such as the health impacts of contamination, possible damage to farming systems, or deposition in the Arctic. However, this study focuses on the effects that concentration levels of fine parhles (PM2,5) and ozone cause on human health.

These effects are calculated as premature deaths from exposure to these pollutants (PM2,5 and O_3), taking into account the causes defined in Forouzanfar et al., 2016a, including cardiovascular, respiratory, embolism or lung cancer. Parameters and calculation of premature deaths from disease are detailed in Burneä et al., 2014.

Bibliography

Aäademo, L., Bernardini, F., 2017. Air polluAon and urbanicity: common risk factors Burneä, R.T., Pope, C.A., III, EzzaA, M., Olives, C., Lim, S.S., Mehta, S., Shin, H.H., Singh, G., Hubbell, B., Brauer, M., Anderson, H.R., Smith, K.R., Balmes, J.R., Bruce, N.G., Kan, H., Laden, F., Prüss-Ustün, A., Turner, M.C., Gapstur, S.M., Diver, W.R., Cohen, A., 2014. An Integrated Risk FuncAon for EsAmaAng the Global Burden of Disease Aäde table to Ambient Fine ParAculate Maäer Exposure. Environ. Health Perspect. häps:// doi.org/10.1289/ehp.1307049

Forouzanfar, M.H., Afshin, A., Alexander, L.T., Anderson, H.R., Bhuäa, Z.a., Biryukov, S., Brauer, M., Burneä, R., Cercy, K., Charlson, F.J., others, 2016a Global, regional, and naAonal comparateAve risk assessment of 79 behavioural, environmental and occupaAonal, and metabolic risks or clusters of risks, 1990-2015. Lancet.

Kitous, A., Keramidas, K., Vandyck, T., Saveyn, B., Van Dingenen, R., Spadaro, J., Holland, M., 2017. Global Energy and Climate Outlook 2017: How climate policies improve air quality. Joint Research Centre (Seville site).

OECD 2016: The Economic Consequences of Outdoor Air PolluAon, 2016. OECD Publishing.

Searl, A., Ferguson, J., Hurley, F., Hunt, A., 2016. Social Costs of Morbidity Impacts of Air PolluAon (OECD Environment Working Papers No. 99).

Van Dingenen, R., Dentener, F., Crippa, M., Leitao-Alexandre, J., Marmer, E., Rao, S., Solazzo, E., ValenAni, L., 2018. TM5-FASST: a global atmospheric source-receptor model for rapid impact analysis of emission changes on air quality and shortened climate pollutants.

ANNEX C. MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN

Table C.1 Table summarising the main elements of the fight against climate change in Spain

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**Year I.**	
CROSS-SECTORAL POLICIES AND MEASURES						
Operational programmesMvos of the Autonomous Communities	Cross-sectoral	Regional development and emission reduction, especially in Thematic Object 4 *"Fostering the shift to a low-carbon economy in all sectors"*	CO_2 CH_4 N_2O HFC	EC	I	2014
Climate projects	HTA No.	Reduce emissions in diffuse sectors and support the development of a low-carbon economic acMvity.	GHG	EC	I	2012
Carbon footprint record, compensation and CO_2 removal projects	Cross-sectoral	Encourage the calculation of carbon footprint by Spanish organisations.	CO_2 CH_4 N_2O HFC	I	I	2014
Operational programmeSustainable growthMvo 2014-2020	Cross-sectoral	Sustainable growth under ERDF. They highlight low-carbon economy measures, integrated and sustainable urban development, water quality and sustainable transport.	CO_2	EC	E	2015
Implementation of the European Emissions Trading System	ETS	Achieve the reduction of GHG emissions from the energy and industry sectors, through the sector emission allocation ceiling. Object: Achieve a 62 % reduction in EU ETS emissions compared to 2030 (EU) levels by 2005.	GHG	EC	I	2005
European Directorate of Carbon capture and storage (CCS)	Cross-sectoral	NormaMva for environmentally safe geological storage of CO_2 to help combat climate change.	CO_2	N	A	2009
Funding of demonstration projects. NER300 programme	Cross-sectoral	Promotion of the construction of CO2 capture and geological storage projectsand innovative renewable energy technologies on EU territory. With 38 projects up to 2014.	CO_2	R &A MP; I	D	2010
Strategic projects for economic recovery and transformation (PERTE)	Cross-sectoral	Projects of a strategic nature to promote economic growth, employment and competitiveness of the Spanish economy, including several sectors focused on sustainability and decarbonisation.	GHG	R &A MP; I JU	P	2021
National Air Pollution Control Programme	Cross-sectoral	Programme for the fulfilment of anthropogenic air emission reduction commitments, in relevant sectors such as industry, transport and agriculture, for the periods from 2020 to 2029, and in 2030.	So_2 NO_x NH_3 Other	P	I	2020
National Climate Change Adaptation Plan (PNACC) 20212030		Basic planning instrument to promote coordinated and coherent action against the effects of climate change in Spain and foster adaptation and resilience to climate change.	GHG	P	I	2020

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**Year I.**	
Long-term Decarbonisation Strategy	Cross-sectoral	Path to reach climate neutrality Mca by 2050	GHG	P	I	2020
Fair transition strategy	Cross-sectoral	Maximising employment opportunities and minimising the impacts of the energy transition	GHG	P, N	I	2019
Act 7/2021 on Climate Change Energy Transition	Cross-sectoral	Actions for the decarbonisation of the economy, its transition to a circular model, adaptation to the impacts of climate change and the implementation of a sustainable development model	GHG	N	I	2021
SECTORAL POLICIES AND MEASURES						
Energy Sector Jco						
Investment Fund for Energy Diversification and Saving – F.I.D.A.E	Energy Other	It aims to finance sustainable urban development projects that improve energy efficiency or uminish renewable energy.	CO_2	EC	E	2011
Saving and Efficiency Action Plan 2014-2020	Energy Other	Achieving final energy savings for the period 2014-2020	CO_2	P	I	2014
Planning of Electricity and Gas Sectors 2014-2020	Energy	Meet the energy efficiency, renewable energy and environment objectives of 2020.	CO_2	P	I	2014
Renewable Energy Plan (RER) 2011-2020	Energy Other	Promoting the consumption of renewable energy.	CO_2	P	I	2011
Industrial Sector						
SF6 Voluntary Agreement – Electricity sector	Industrial	Reduction of F-gas emissions.	SF_6	AV	I	2015
Royal Decree 115/2017 on F-gases	Industrial	Reduction of F-gas emissions.	PFC SF_6, HFCS	N	I	2017
National tax on fluorinated greenhouse gases	Industrial	Replace fluorinated gases with other substances; Reduction of F-gas emissions.	PFC SF_6 HFCS	F	I	2014
IPPC Integrated Pollution Prevention and Control	Industrial	Integration of environmental authorisations for industrial acronyms.	GHG	N	I	2003
BREF documents	Industrial	Description of the Best Available Emission Reduction Techniques for each industrial sector	GHG	N	I	2010
PRTR component 12: Spanish Industrial PoliMca 2030	Industrial	The main challenges faced by industry and addressed by this component are: (I) data-driven digital transformation in the area of industry and services, (ii) strengthening its weight in the Spanish economy and increasing the size of industrial enterprises, and (iii) improving efficiency in water, waste, energy and resource, emissions and renewable energy in the circular economy.	GHG	P	I	2021

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**Year I.**	
PERTE Industrial Decarbonisation	Industrial	Supporting industry in its transition towards more environmentally friendly models and processes and contributing to the Mca neutrality objective in 2050	CO_2	P	I	2022
Transport Sector						
Safe, Sustainable and Connected Mobility Strategy 2030	Transport	Axes and measures for the decarbonisation of mobility, infrastructure and transport	GHG	N, P	I	2021
Energy Efficiency Strategy 2030 of the State Road Network	Transport	Measures to boost the energy efficiency of lighting and reduce dependence on fossil fuels on companies providing conservation and exploitation services.				2024
Indicative strategy for the development, maintenance and renewal of railway infrastructure	Transport					2021
Goods 30	Transport					2022
RENFE, ADIF and ADIF Master Plan for Combating Climate Change 2018-2030 – High Speed	Transport	Energy saving measures and improving energy efficiency at high speed.	CO_2	N, P	I	2018
Plan to combat climate change 2018-2030 by Adif and Adif Alta Velocidad	Transport					2018
Eco-incenMvo subsidies for rail freight	Transport	Development and use of rail services with proven merits in the environmental field	GHG	EC	P	2022
Action Plan on reducing CO2 emissions fromthe international aviation sector in Spain	Transport	Measures for the sustainability of the aviation sector	CO_2	P	I	2021
Airport Regulation Document 2022-2026	Transport					2022
White Paper on R & D & I for the sustainability of aviation in Spain	Transport Energy	Identify R & D & I challenges to boost sustainable air transport in Spain	GHG	R & I	I	2021
Emissions reports produced in the previous year each air operator subject to emissions trading	Transport	Monitoring of emissions produced by each airline	CO_2	I	I	2018
Emission improvement reports for each air operator	Transport	Improvement measures for each operator's emission reduction	CO_2	I	I	2018
PERTE Aerospace	Transport	Generate a new space technology programme providing services related to the environment and territorial cohesion	CO_2	P	I	2022
Aena Sustainability Strategy and its Climate Action Plan2021: Heading Zero Emissions	Transport Energy	Own (direct and indirect) and third party emission reduction measures	CO_2	AV	I	2021
Green Sky sustainability strategy	Transport					2021

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**S**	**Year I.**
Framework Agreement for the project, supply or installation of energy-efficient lighting systems	Transport Energy	Improvements in the efficiency of airport lighting systems.	CO_2	AV	I	2015
Second Framework Agreement on efficient lighting	Transport Energy	Improvements in the efficiency of airport lighting systems.	CO_2	AV	I	2017
Accreditation of carbon footprint at airports	Transport	Obtaining and renewing carbon accreditation at several airports.	CO_2	AV	I	2011
Power supply at 400 Hz for aircraft at airports	Transport Energy	Boosting the use of electricity for stationary aircraft.	CO_2	P	I	2016
Phasing-in of renewable energy at airports	Transport Energy	UMlising altered energy sources Mva and diversifying energy production at airports.	CO_2	Others	I	2000
Option of aircraft taxiing movements	Transport	Minimise aircrafts' fees and tours at the airport.	CO_2	AV	I	2014
Reduction of combat Mble during flight, approach and landing	Transport	Choose trajectories for safer, more cost-effective and sustainable operations	CO_2	R & I	P	2022
Redesign and manufacturing of more efficient aircraft elements	Transport	Use of smart technologies for the design and manufacturing of components such as wings.	CO_2	R & I	P	2021
Renewal of heavy goods and passenger vehicle fleets and agricultural tractors	Transport	Finance the bullying of companies' heavy duty vehicles (with fewer than 3.000 employees).	CO_2	EC	I	2016
Programme for the transformation of heavy goods vehicle fleets for professional road transport	Transport	Boosting the decarbonisation of professional road transport (heavy-duty vehicles)	CO_2	EC	I	2021
Call for tenders for concessions for regular road passenger transport	Transport	Establish energy efficiency and pollutant requirements in concession specifications.	CO_2	N	I	2014
Incorporation of criteria encouraging the use of assistive equipment in less polluting Merra	Transport	Encouraging the use of less polluting equipment.	CO_2	Others	I	2015
Aid for the implementation of fleet gesMon systems	Transport	Implementation of efficient gesmon systems for vehicle fleets.	CO_2	EC	I	2015
Aid for the financing of urban mobility plans and business mobility plans	Transport	Development of urban mobility plans (modal shift)	CO_2	EC	I	2014
Efficient Vehicle Incentive Programme PIVE (PIVE I, II, III, IV, V, VI, VII and VIII)	Transport	Renewal of the light vehicles fleet by more efficient ones.	CO_2	EC	E	2012
Efficient driving courses in road transport	Transport	Efficient driving in road transport.	CO_2	ED	I	2015
Training for Digital Empowerment and Sustainability in Transport and Mobility	Transport	Training Actions for the acquisition and improvement of professional skills for sustainability in transport and mobility	CO_2	ED	I	2022
Integrated Strategy for the Promotion of Electric Vehicles in Spain and MOVELE Plans, and MOVEA (since 2016)	Transport	Encourage the penetration of the electric vehicle, aimed at promoting disruptive technologies.	CO_2	EC	E	2010

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**S**	**Year I.**
Action Programme for Mobility, Efficient and Sustainable Mobility (MOVES I, II and III) and Fleet MOVES	Transport	Encourage electric mobility with the purchase of electric vehicles and the deployment of charging infrastructure	CO_2	EC	I	2019
PERTE for the development of the electric and connected vehicle	Transport	Creating the ecosystem needed for the development and manufacturing of electric and connected vehicles	CO_2	P	I	2021
Environmental Promotion Plan – PIMA Transport	Transport	Renewal of the road transport fleet.	CO_2	EC	E	2014
Environmental Promotion Plan PIMA Air Plans (I, II, III and IV)	Transport	Renewal of the commercial vehicle fleet.	CO_2	EC	E	2013
Royal Decree 1085/2015 of 4 December 2006 on the promotion of biofuels	Transport	Establish the pathway for introducing biocombusMbles into transport by 2020.	CO_2	N	I	2017
Royal Decree 376/2022 on the sustainability of biofuels, bioliquids and combat biomass	Transport	Establish sustainability and GHG emissions saving criteria for biofuels, bioliquids and combustion biomass	CO_2	N	I	2022
Gesmon programme and service delivery	Transport	Efficiency in the ustilisation of resources and their rationalisation.	CO_2	P	I	2012
Promoting urban mobility plans	Transport	Local authorities approve mobility plans.	CO_2	EC	I	2014
PRTR component 1: Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas	Transport	Boosting the decarbonisation of urban mobility, improving air quality and quality of life in cities	CO_2	P	I	2021
PRTR component 6: Sustainable, safe and connected mobility	Transport	Modernise, digitalise and improve the safety and sustainability of key inter-urban and intermodal transport infrastructure	CO_2	P	I	2021
Aid for the establishment of low-emission zones and the transformation of urban transport.	Transport	Creation of low-emission zones and the digital and sustainable transformation of urban transport	CO_2	EC	I	2021
Transport voucher	Transport	Promotion of the transport of employees' collectors.	CO_2	F	I	2010
Registration tax: Law 38/1992 of 28 December 1992 on special taxes	Transport	Tax levied on the basis of the level of CO2 emissions.	CO_2	F	I	2008
Framework for National Action on AlternaMvas Energy in Transport	Transport	Promotion of tamper-changing combusMbles in transport at 2020.	CO_2	N	I	2017
Classification of the vehicle fleet according to the level of emissions	Transport	IdenMfy the category of vehicles so that municipalities can develop environmental policies.	CO_2	N	I	2015
Efficient driving: Order INT/2229/2013, Regula access to registration certificates	Transport	Include efficient driving in the programme for obtaining a driving licence.	CO_2	ED	I	2014
Amendment of the General Traffic Regulation	Transport	It modifies the general speed limits set for vehicles on road discs.	CO_2	N	I	2020
Strategic framework of the port system of general interest	Transport					2022
Sustainability Strategy and State Ports Agenda 2030	Transport					2019
Port Land Accessibility Financial Fund	Transport					2015
Motorways of the Sea	Transport	Modal shift in road freight to ship.	CO_2	P	I	2010

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**Year I.**	
Efficiency measures in ports	Transport	Efficient use of the general public lighting service in ports.	CO_2	AV	I	2016
Port Accessibility Investment Plan	Transport	Promote the connectivity of ports and the intermodality of marshalling and rail.	CO_2	P	I	2017
Liquefied natural gas (LNG) supply in ports	Transport	Boosting the use of LNG in maritime transport.	CO_2	N, P R	I	2016
Electricity supply to ships at berth in ports	Transport Energy	Boosting the use of electricity for use by ships at berth in ports.	CO_2	EC	I	2016
PERTE for the shipbuilding industry	Transport	Improving the environmental sustainability of the sector	CO_2	P	I	2022
Subsidies for Eco-incenMvo in MaríMmo transport	Transport	Development and use of maritime transport services with proven merits in the environmental field	GHG	EC	P	2022
Residential, Commercial and Social Sector (RCI)						
Environmental Promotion Plan for the promotion of energy rehabilitation of hotel installations PIMA Sol	RCI	EsMmular the energy rehabilitation of hotel facilities.	Co_2 and NO_x	EC	E	2013
Environmental promotion plan to encourage and support climate change in urban and interurban areas. PIMA Climate Change	RCI	Propose innovative pilot actions and drafting projects and technical reports in urban and interurban spaces.	CO_2	EC, R & I	E	2022
Plans for the renovation of tourist installations	RCI	Renovation and improvement of Turkish establishments under sustainability and energy efficiency criteria.	CO_2	EC	I	2009
State Financial Fund for Turkish Competence	RCI	To promote, by means of loans, the improvement of the competitiveness of the Turkish sector, in particular those projects that contain actions to digitalise the Turkish Devices and to innovate and modernise services.	CO_2	EC	I	2021
Renovation of buildings of the General Administration of the State	RCI	Energy renovation of the building stock.	CO_2	P	I	2015
PRTR component 11: Modernisation of public administration	RCI	Promote energy savings and efficiency and promote the ustilisation of energy from renewable sources in buildings and infrastructure.	CO_2	EC	I	2021
Regulation on Facilities Heating in buildings (RITE)	RCI	Increase the minimum energy efficiency requirements of thermal and climate heating installations in buildings.	CO_2	N	I	2013
Aid programme for the energy renovation of existing buildings (PAREER- CRECE programme)	RCI	Improvement of the thermal envelope, thermal and lighting installations, use of renewable energies.	CO_2	EC	I	2013
Technical Building Code (CTE)	RCI	Increased energy efficiency requirements and incorporation of renewable energies.	CO_2	N	I	2013
Law 8/2013 on Urban Renovation, Regeneration and Renovation	RCI	Facilitate the approval of projects for energy renovation of buildings and urban regeneration.	CO_2	N	I	2013
State Housing and Renovation Plan and State Plan for the Promotion of Rental, Building Rehabilitation, Urban Regeneration and Renovation (2013-2016)	RCI Energy	Improvement of the thermal envelope, cooling systems, installation of renewable energy and energy efficiency.	CO_2	P	I	2013

State Housing Plan 2018-2021	RCI Energy	Contribute to jobs, growth, competitiveness of the economy and environmental sustainability.	CO_2	P	I	2018

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**Year I.**	
State Plan for Access to Housing 2022-2025	RCI	Focus efforts on facilitating access to housing through rent support for vulnerable citizens, without prejudice to support for the construction of social rented housing in energy-efficient buildings	CO_2	P	I	2022
Component 2: Housing rehabilitation and urban renewal plan	RCI Energy	Boost the energy renovation of the building stock in Spain and the increase in the social rental housing stock	CO_2	P	I	2021
Energy Setting of New and Existent Buildings	RCI Energy	Royal Decree 390/2021 of 1 June 2015 approving the basic procedure for establishing and improving the energy efficiency of buildings and dwellings.	CO_2	N	I	2021
Agricultural sector						
Operational programmeMvo maríMmo and fisheries	Agricultural	Several measures contribute to thematic objective 4 "Fostering the shift to a low-carbon economy in all sectors".	CO_2	E	I	2014
Efficient driving of tractors	Agricultural	Reduction of emissions due to good driving practices.	CO_2	ED	I	2014
Royal Decree 448/2020 of 10 March 2006 on the characterisation and registration of agricultural machinery	Agricultural	Encourages the establishment of voluntary quality tests based on the application of certain technical procedures to verify energy efficiency, where applicable, and compliance with design, agronomic efficiency and environmental protection standards.	CO_2	N	I	2020
Strategy for supporting organic production	Agricultural	Promotion of measures that can contribute to the development of organic production.	N_2O CO_2	P	I	2014
Plan to reduce the use of nitrogenous fertilisers	Agricultural	Reduction of the use of nitrogenous fermolisers and therefore the reduction of emissions, either during their manufacture or their application to the field.	N_2O	ED	I	2007
National Programme for Rural Development (NRDP) 2021-2022	Forestry Agriculture	Prevention and restoration after major fires, conservation of forest genetic resources, conservation of forest carbon.	CO_2 CH_4 N_2O	P	I	2015
Rural Development Programmes by Autonomous Communities 2014-2020	Forestry Agriculture	Reduction of emissions by different measures: gesmon of cultivars, pastures, soils and livestock farming, reduction of fermolisation, forest carbon conservation, forest gesmon and prevention of deforestation.	CO_2 N_2O CH_4	P	I	2014
Strategic Plan for the Common Agricultural Policy (CAP Strategic Plan)	Forestry Agriculture	It contributes to the mitigation of climate change and adaptation to its effects, promotes sustainable development and efficient gesmon of natural resources and contributes to the protection of biodiversity.	CO_2 N_2O CH_4	P	I	2022
Royal Decree 1051/2022, of 27 December, laying down rules for sustainable nutrition in agricultural soils.	Agricultural	It lays down basic rules for achieving a sustainable input of nutrients in agricultural soils.	N_2O CO_2	N	A	2022
Agri-food PERTE	Agricultural	Its objection is to promote the integrated development of the entire agri-food chain through the digitalisation of processes and the incorporation of knowledge and innovation.	CO_2 CH_4 N_2O	P	I	2022

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Denomination	**Sector (s)**	**Subject matter or activity concerned**	**GHG**	**I**	**S**	**Year I.**
Time for digitalising the water cycle	Agricultural	It will transform and modernise water gesmon systems, both for the urban water cycle and for irrigation and industrial uses. It will improve efficiency, reduce losses in water supply networks and thus save water and energy consumption.	CO_2	P	I	2022
PRTR component 3: Green and digital transformation of agri-food and fisheries industries	Agricultural	The actions included in the component focus on aspects such as improving the sustainable use of agricultural soils, promoting digitalisation and the circular economy and modernising irrigation, to reduce the use of natural resources and agricultural inputs and to improve the competitiveness and sustainability of the agricultural sector.	CO_2 CH_4 N_2O	P	I	2021
Initiative Mva 4 per thousand for increasing soil organic carbon and food security	Agricultural	Increase the organic carbon content of soils.	CO_2	P	P	2017
Forestry sector						
Restoration of forest cover and extension of wooded area	Forestry	Afforestation.	CO_2	N, P	I	1990
Sustainable Forest Gesmon	Forestry	Sustainable Forest Gesmon.	CO_2 CH_4 N_2O	N, P	I	1990
PRTR component 4: Ecosystems and biodiversity conservation and restoration	Forestry	It aims to achieve good conservation status of ecosystems through ecological restoration when needed, and reverses biodiversity loss, sustaining the sustainable use of natural resources and preserving and enhancing their ecosystem services.	CO_2 CH_4 N_2O	P	I	2021
Waste Sector						
Plan to boost the environment PIMA Waste	Waste	Encourage the collection and treatment of organic matter, the capture of biogas and its use.	CH_4 N_2O	EC	E	2015
Strategy "More food, less waste"	Waste	Reduction of food waste.	CH_4 N_2O	I	I	2013
State Waste Framework Plan 2016-2022	Waste	Implement the Gesmon Waste Hierarchy.	CH_4 N_2O	P	A	2016
State inspection plan for transboundary shipments of waste 20212026	Waste	And strengthening compliance with the NormaMva on waste shipments	CH_4 N_2O	P	I	2021
Law 7/2022 of 8 April 2003 on waste and contaminated soil for a circular economy	Waste	Regulation of the legal regime applicable to the placing on the market of products in relation to the impact on the gesmon of their waste, as well as the legal regime for the prevention, production and gesmon of waste.	CH_4 N_2O	N	I	2022

I = AV, voluntary agreement; EC, economic; Ed, education; F, prosecutor; I, information system; R & I, invadement, development and innovation; N, NormaMvo; M, market; P, Plans and Programmes

S = A, adopted; I, implemented; P, planned; E, expired (if still effective)

S.D. indicates no data, **N.C. not how** it can be measured, and **I.O.** integrated in another level

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

ANNEX D – ELECTRICITY GRID REPORTS FOR SPAIN

The analysis of the scenarios defined for the Spanish system consists of the simulation of the generation dispatch and the supply chain for the coverage analysis in the Spanish mainland system by 2030.

This Annex is structured as follows:

- D.1 Generation dispatch studies in PNIEC scenario 2023-2030
- D.2 Probative studies of the supply side of the PNIEC 2023-2030

In addition to these analyses, ACER has started the previous development of the calculation of flexibility needs at European level considering a methodology to assess the flexibility needs of the electricity system. REE, in collaboration with MITECO, is working on this analysis pending the adoption of a strict definition of this methodology for the definition of the necessary flexibility objections. Currently, Red Eléctrica parAcipa in the development of this methodology through the ENTSO-E Task Force NaAonal Flexibility Needs.

D.1 GENERATION DISPATCH STUDIES OF THE PNIEC SCENARIO 2023-2030, IN HORIZON 2030

The purpose of this document is to show the generation dispatch results of the 'PNIEC 2023-2030' scenario updated by MITECO for the horizon 2030.

It also includes a brief description of the methodology and model used, as well as the adaptation of assumptions of the national scenarios defined by MITECO for their use in the European-wide study model. Please refer to Annex B for further details on the uAlised simulation tool.

Methodology

The analysis of the scenarios defined for the Spanish system consists of the simulation of the generation dispatch and the supply chain for the coverage analysis in the Spanish mainland system under the scenarios described below and analogous to the studies carried out in ENTSO-E for the preparation of the analyses at European level.

For the purpose of this analysis, there has been a halt to a European-level model that has been used as part of ENTSO-E. This model is the basis for both the energy balance studies and the probabilistic coverage studies included in this Annex D.

The model considers the pan-European perimeter and neighbouring areas connected to the European electricity system. The pan-European perimeter is explicitly modelled, while neighbouring areas can be explicitly or non-explicitly modelled. Those explicitly modelled are represented by market nodes that consider complete information uAlising the best available resolution of input data and for which the Unit Commitment's Economic Dispatch (UCED) problem is resolved. For areas not explicitly modelled, exogenous fixed energy exchanges with explicitly modelled areas apply.

Neighbourhood countries that have been implicitly modelled, i.e. via fixed (green) exchanges and non-modelled countries (orange).

Figure D.1. European environment considered. Source: ENTSO-E

Source: Red Eléctrica de España

A simplified model of the system is used where Different Modulated Systems (bidding zones) are represented as a network of knots interconnected by the commercial capacity available to the market (NTC – Net Transfer Capacity) depending on the quantitative interconnections between them. In general, the uAliza model is the hourly values of trading capacity (NTC) between the modelled systems.

This is equivalent to the fact that within each bidding zone the calculation of the generation dispatch considers a single node, i.e. any limitations on generation due to elements of the internal network of each system are not taken into account. It is important to stress that this assumes in the model that the transmission network of the Spanish mainland system will have sufficient capacity to evacuate the entire modelled generation and transport it to the consumption points and that the electricity system variables are kept within the ranges established by the NormaAva to achieve the level of safety required by the latter. This will require the development and adaptation of such a grid to minimise surplus renewable generation by balancing204, or potential additional needs for thermal generation due to possible internal grid constraints, so that it is unique.

The simulations uAlise as the basis for a perfect market for competition in electricity generation and therefore do not include the potential supply strategies of generators: the supply of each generator is equal to its variable cost esAmado and the generation dispatch is obtained by

Refers to surplus renewable generation that cannot204 be integrated into the system in the production or balancing markets. These surpluses are caused by possible overloads in the networks, which are resolved by the application of the mechanism of technical restrictions in the transmission system or in the distribution system.

minimising the variable generation cost in the European system as a whole under the condition of supplying electricity demand in all systems over the analysed time horizon. Therefore, the economic indicators resulting from the simulations in this annex do not correspond, in any event, to daily market matching price calculations and should not be interpreted as valid parameters for investment decision making.

Variable generation cost values are based on predicted fuel prices, esAmated operating and maintenance costs for each technology and CO2 emission$_{costs}$. They are not considered to be fixed generation costs, decommissioning costs of groups currently in service and not taken into account in the scenario to be assessed, possible costs of ubiquitous lifetime of generating groups or other factors (tolls, taxes) that may influence generation's supply strategy.

Cogeneration, renewable generation and in general all non-gesAonable generation are considered to be at zero variable cost, which gives them priority dispatch over other conventional thermal generation technologies.

For the purpose of calculating the generation dispatch, each conventional thermal generation unit is modelled with its operating parameters, its availability and accidental failure rates. Hydropower generation is modelled consistently with historical production series and wind, photovoltaic and thermosolar generation uAlising historical primary resource weather series. Similarly, cogeneration and other generations are modelled on historical data.

For the 2030 horizon, a full simulation of the generation dispatch of the European system is carried out for one year with hourly granularity, respecting all the restrictions of the groups (starting, stopping, raising and lowering load, must run, reservoir levels, minimum/maximum hydraulic power, etc.) to the Aempo, which minimises the total variable cost. In the simulations, the results of which are presented for annulment, a restriction has been put in place on coupled thermal generation in the Spanish mainland system of a minimum value sufficient to safeguard the dynamic stability of the electricity system. This minimum generation required corresponds to the generation of 3 nuclear groups and 7 combined cycle groups to the technical minimum for the scenario with horizon 2030.

For this analysis, minimum frequency/power control reserves have been included in all European countries. Spain's power frequency control reserve considered for this study is 2 400 MW.

As a result, the values of energy generated by each thermal unit and modelled generation technology, marginal cost values, exchange balance and other variables, such as non-delivered energy, if any, of exchange capacity and other restrictions imposed on the model, are given in time detail. It is very important to note that cost results should not be interpreted as prices and that the results obtained from the exchange of energy between interconnected systems are only the result of the marginal cost difference between those systems with the limitation of the value of trading capacity considered in the scenario.

UAlising these results, we calculate the generation balance and indicators of interest, such as the total value of renewable generation and the fraction it represents of electricity generation and demand in the Spanish mainland system, in order to obtain renewable penetration percentage values.

Adaptation of the scenarios defined by MITECO to the Europe-wide model.

The European framework contains models available in the field of ENTSO-E. In the case of France and Portugal due to their greater impact, the published information from the update of their draft NECPs in 2023 has been implemented. This scenario is adapted in accordance with the MITECO assumptions considered in the drafting of this NECP for Spain for the 2030 horizon.

The inclusion in the European model of each scenario proposed by MITECO for the Spanish system requires the adaptation of demand-side scenarios, renewable generation profiles, installed generation capacity of each technology and its dispatching characteristics to determine the values corresponding to the scope of the Spanish mainland system, as well as the conversion of the power values to net values. The scenarios obtained represent the scenario that is now called the adapted mainland scenario.

In addition, the European scenario also modifies the cost scenarios for combusAbles, which correspond to those used in this Plan. These new variable costs apply both to Spain and to the entire generation fleet considered in the Europe-wide model.

The set of assumptions described above provides the basis for calculating the unit variable electricity cost of each generation technology for the determination of the resulting generation balance, and of the energy not delivered, if any, in order to minimise the cost of the system to the Aempo that the restrictions imposed on the model are respected.

Finally, it should be noted that the generation scenario installed in the other systems commands the original generation park of the European scenario. Therefore, the results that will be obtained only include in the Spanish area the update of the NECP scenarios together with the update of the neighbouring countries of France and Portugal. The process of updating the energy and climate plans by the Member States of the European Union, as in Spain, is ongoing and, therefore, the result of the simulations of power dispatch at European level could produce different results depending on the degree to which they are updated in their final versions.

Assumptions of the scenarios defined by MITECO and values of the corresponding adapted scenario.

case, the corresponding values of the adapted mainland scenario205. The variable generation cost assumptions are ualised for the entire generation installed in the European model.

Variable generation costs

In order to determine the variable cost values of thermal generation technologies, the following combustion cost and CO2 emission cost values$_{set}$ in the MITECO scenario are used. For the rest of the combusAbles, the values of the uAlised scenario are maintained as a basis for the European model in question. Variable operating and maintenance costs and efficiencies are also maintained as in the European model.

Table D.1 shows the fuel prices and CO_2 emissions to EUR 2016.

Table D.1 Fuel and CO_2 emission prices considered for 2030

Scenario	
2030	**2030**

205Values obtained by subtracting from the national power forecast by the Ministry the expected power of the TNPs.

MITECO	Adapted Peninsular		
EUR/net GJ	Nuclear	0,47	0,47
	Lignite	3,7	3,7
	Hard Coal	3,7	3,7
	Gas	7,5	7,5
	Light oil	11,6	11,6
	Heavy oil	11,6	11,6
	Oil shale	3,00	3,00
EUR/ton	Co_2 price	**79**	79

Source: MITECO

In addition, given the volatility of fuel prices, in particular gas prices, a sensitivity analysis has been carried out to see the impact of an increase in gas prices. Gas prices have been assumed to increase, reaching EUR 10,5/GJ. In order to define this maximum range, we have considered the best esAmation of European sources.

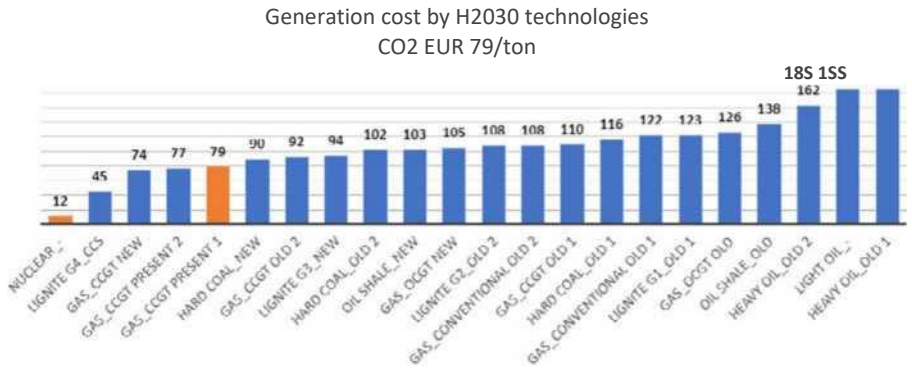
Table D.2 shows the emission factors for each technology used in the European-wide model in accordance with the criterion set out in ERAA 2022.

For the generation dispatch simulations carried out in this study, the emission factor considered for cogeneration, electricity part, is 0.262 t/MWh.

Combustible	Type	CO_2 emission factor	Efficiencies stockings	CO_2 emission factor
		kg/Net GJ	%	T/MWh$_e$
Nuclear	— —	0	33 %	0,000
Hard coal	Old 1	94	35 %	0,97
Hard coal	Old 2	94	40 %	0,85
Hard coal	New	94	46 %	0,74
Hard coal	CCS	9.4	38 %	0,09
Lignite	Old 1	101	35 %	1,04
Lignite	Old 2	101	40 %	0,91
Lignite	New	101	46 %	0,79
Lignite	CCS	10,1	38 %	0,10
Gas	Convention old 1	57	36 %	0,57
Gas	Convention old 2	57	41 %	0,50
Gas	CCGT old 1	57	40 %	0,51
Gas	CCGT old 2	57	48 %	0,43
Gas	CCGT present 1	57	56 %	0,37
Gas	CCGT present 2	57	58 %	0,35
Gas	CCGT new	57	60 %	0,34
Gas	CCGT CCS	5,7	51 %	0,04
Gas	OCGT old	57	35 %	0,59
Gas	OCGT new	57	42 %	0,49
Light oil	— —	78	35 %	0,80
Heavy oil	Old 1	78	35 %	0,80
Heavy oil	Old 2	78	40 %	0,70

Source: Red Eléctrica de España

As a result of the above scenarios of fuel prices and CO_2 emissions, the variable generation costs of the generation technologies considered in the Europe-wide scenario presented in Figure D.2 are obtained at EUR 2016. In this figure, the technologies installed in the Spanish mainland system are those depicted in orange.



Source: Red Eléctrica de España

In the sensitivity analysis of gas price increases, the merit order would change to gas technologies more expensive than coal technologies.

Operating hours renewable generation

Table D.3 shows the operating hours included in the model obtained from the information provided by MITECO for the Spanish system. In case of surplus renewable generation per balance, the number of operating hours resulting from the simulation may be reduced.

Table D.3 Annual operating hours by technology

Technologies	MITECO annual operating hours
	2030
Onshore wind (1)	2.100 – 2.500
Wind offshore	4.278
Existing thermosolar	2.200
Future thermosolar	3.594
Photovoltaic (1)	1.600 – 2.000
Cogeneration and others (2)	4.250
Rest of RES (2)	5.600

1 Depending on whether it is existing/repowered/new/self-consumption/associated electrolysers
2 Weighted average of the component technology discs

Source: Red Eléctrica de España

Demand

Inorder to establish the expected demand values, the values at national level provided by MITECO have been adapted to values for the Spanish mainland system. The other systems use the values of the analysis of the European model in question.

2023-2030 is shown in Table D.4.

Table D.4 Demand values PNIEC 2023-2030 MITECO

Demand	PNIEC Scenario 2023-2030 Peninsular ADAPTED
	2030
Demand (TWh)	344,0
Peak demand (MW)	53.794

Source: Red Eléctrica de España

11.980 MW of electrolysers are modelled in 2030, whose consumption complies with the additionality criteria governed by the first Hydrogen Delegated Act (EU 2023/1184) supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council establishing a common Union methodology defining detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin.

Installed power park

The generation park considered by MITECO in the PNIEC Scenario 2023-2030 is shown in Table D.5.

Table D.5 Installed power PNIEC 2023-2030 MITECO

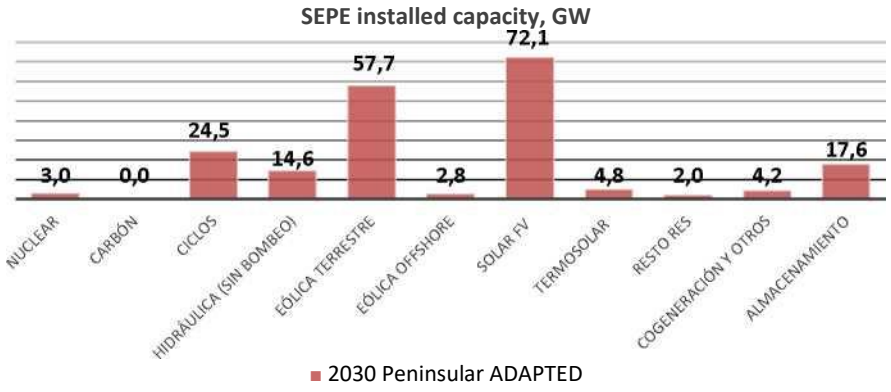
(data in MW)	MITECO (national)	Mainland ADAPTED
	2030	2030
Nuclear	3.181	3.041
Coal	0	0
Cycles	26.612	24.499
Hydraulic (not pumped)	14.511	14.562
Wind onshore	59.054	57.737
Offshore wind	3.000	2.800
Solar FV	76.277	72.130
Thermo-solar	4.804	4.804
Other RES	1.964	1.964
Cogeneration and others	4.205	4.205
Fuel and Fuel Gas (TNPs)	1.830	
Others	19	
Storage	18.913	17.612
Total	214.370	203.353

Source: MITECO/Red Eléctrica

It is worth noting the phasing out of the nuclear power park until three nuclear groups out of the seven currently available are considered available at the end of 2030, and the closure of the coal-fired power park until its disappearance. It is considered a strong growth and solar PV relative to the park currently in service and the installation of new thermosolar generation during the period covered and a significant growth in self-consumption. Cogeneration is slightly reduced compared to the current value.

Figure D.3 shows the net power values for each generation technology in the Spanish mainland electricity system in both PNIEC 2023-2030 and adapted mainland scenarios.

Figure D.3. Installed capacity in the Spanish Peninsular System MITECO Adapted H2030



Source: Red Eléctrica de España

Commercial capacity to exchange with neighbouring electricity systems

Table D.6 shows the exchange capacity values with France and Portugal. The energy exchange flows are the result of the analysis carried out as the model has the full detail of these systems.

Table D.6 Interconnection values Spain-France, Spain-Portugal

NTC (MW)	PNIEC 2023-2030 MITECO 2030
— > FR	5.000
FR- > IS	5.000
— > PT	4.200
PT- > IS	3.500

Source: Red Eléctrica de España

The exchange between Spain and Morocco, which is in line with current capacity values, and exchanges between the mainland and the national electricity systems of the Balearic Islands and Ceuta are modelled with fixed hourly exchange profiles, as these are areas that are not explicitly modelled. In line with the 2021-2026 transport network planning for the Balearic Islands, the commissioning of a second link with the peninsula has been considered in scenario 2030, which is a

link to the peninsula.

Results of the analysed scenario for horizon 2030

The full results of the simulation of the PNIEC scenario 2023-2030 horizon 2030 are presented in Table D.6 and Figure D.4.

Table D.7 Results PNIEC 2023-2030 H2030 scenario

Scenario	Object H2030			
Demand [TWh] (*)		**344**		
Generation [GWh]		**378.362**		
Technology	**Generation [GWh]**	**% over generation**	**POT. Installed [MW]**	**Hours equiv.p.c.**
Nuclear	**36.881**	9.7 %	3.041	7.224
Coal	**0**	0.0 %	0	0
Combined cycle	**19.750**	5.2 %	24.499	806
Hydraulic (not pumped)	**28.932**	7.6 %	14.562	1.987
Wind onshore	**117.450**	31.0 %	57.737	2.034
Wind offshore	**9.695**	2.6 %	2.800	3.463
Solar FV	**125.377**	33.1 %	72.130	1.738
Thermo-solar	**11.426**	3.0 %	4.804	2.378
Other RES	**10.993**	2.9 %	1.964	5.597
Cogen and Others	**17.859**	4.7 %	4.205	4.247
Balance sheet [GWh]		**— 7185**		
Consumption (GWh)		35.447		
Production (GWh)		28.262		
Generation RENOVABLE [GWh]		**306.772 (* *)**		
RES generation surplus by balance [GWh]		21.714		
INTERCONNECTIONS				
Net balance FR-PT-MA [GWh]		— 27.243		
(- export from SPAIN)				
France [GWh]		— 30.961		
Portugal [GWh]		5.083		
CongesJones (% hours) ES-FR				
ES – > FR		76.7 %		
FR – > IS		7.5 %		
CongesJones (% hours) ES-PT				
ES – > PT		2.9 %		
PT – > IS		19.4 %		
Spread MEDIO ES – FR [EUR/MWh]		**27,4**		
Spread MEDIO ES – PT [EUR/MWh]		**2,5**		
SYSTEM COSTS		interval		

Variable generation cost [EUR/MWh]	29,8-36,6 * * *
Total annual cost vable gene [MEUR]	9.066-11.129 * * *
INCOME FROM CONGESTION IN SPAIN [MEUR]	**599**
RES parycipation indicators (%)	
RES/Gen without storage	81 %
RES/Claim	89 %

Notes: **(*)** Includes self-consumed demand

(2)) Includes the renewable fraction of biomass and biogases consumed in conventional thermal and co-generation.

(3) *) Higher value resulting from considering a gas price of EUR 10,5/GJ compared to the benchmark of EUR 7.5/GJ. The consideration of this value has a limited impact on the balance sheet.

Balance values of the sensitivity of high gas prices due to a lower impact on high gas prices are not included. There is a slight reduction in cycle generation (limited by the must-run condition of these generators) while renewable generation is hardly affected.

Marginal average cost (EUR/MWh): Demand-weighted average cost of purchasing energy.
Variable cost generation (EUR/MWh): Weighted average energy purchase cost plus the cost of additional thermal generation needed to meet the minimum threshold of dispatchable synchronous generation.
Total annual variable cost generation (MEUR): Total energy purchase cost plus the total cost of additional thermal generation needed to meet the minimum threshold of dispatchable synchronous generation.

Source: Red Eléctrica de España

In 2030, on the basis of the assumptions considered, a 81 % penetration of all renewables was achieved over generation without storage and a net export balance with France and Portugal of around 25.9 TWh, with a NTC between Spain and France of 5 GW.

The surplus of renewable generation by balance obtained is 21.7 TWh, 7.3 % of the total renewable output.

Target scenario H2030. Energy and Climate Change Plan.

Mainland Spain *Synchronous Minimum GENERATION:* 7 CC + 3 NUC ***COD 2030-600***

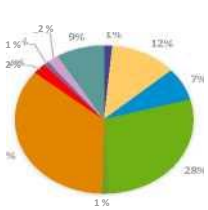
Demand (TWh): **344.0**

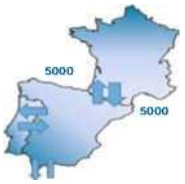
Peak hourly demand (MW): **53794**

Installed capacity (MW)

	MW	%
Nuclear	3041	1 %
Coal	0	0 %
Cycles	24499	12 %
Hydraulic (not pumped)	14562	7 %
Wind onshore	57737	28 %
Offshore wind	2800	1 %
Solar FV	72130	35 %
Thermo-solar	4804	2 %
Other RES	1964	1 %
Cogeneration and others	4205	2 %
Storage	17612	9 %
Total system	**203353**	**100 %**
Electrolysers	**11980**	

Exchange capacity (MW)





Other information:

Renewable power in mainland Spain (MW) ***153997*** *76 %* *from Total System*

Generation Balance (GWh)

	GWh	% use	Hours
Nuclear	36881	10 %	7224
Coal	0	0 %	0
Cycles	19750	5 %	806
Hydraulic (not pumped)	28932	8 %	1987
Wind onshore	117450	31 %	2034
Offshore wind	9695	3 %	3463
Solar FV	125377	33 %	1738
Thermo-solar	11426	3 %	2378
Other RES	10993	3 %	5597
Cogeneration and others	17859	5 %	4247
Generation [1]	**378362**	**100 %**	

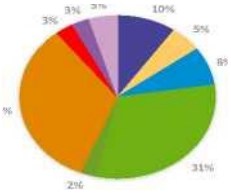
[1] *No storage*

Storage balance **— 7185** GWh

Consumption *35447*

Production *28262*

International exchanges



Profile Morocco

	GWh	
Balance ES-FR	*— 30961*	
Balance ES-PT:	*5083*	
International net balance (FR, PT, MA)	*— 27243*	
Positive: import balance. Negative: export balance.		
Congestion (% hours)		
ES-FR	76.7 %	7.5 %
ES-PT	3 %	19 %

Spread ES-FR (EUR/MWh) [3]: *27.4*

[3] *Hourly average price difference in each hour in absolute value*

Congestion income (MEUR): *599*

Other information [2]:

RES in mainland Spain (GWh) ***306772***81 % *s/Generation (without storage)*

[2] *Includes the renewable fraction of biomass and biogases consumed in conventional thermal and co-generation* *89 %* *s/Claim*

Emission CO ₂ of the generation mix (kton) [4]: *11 986 ton CO 2 eq/MWh: GR of* *0.02948*
CO 2 eq/MJ *8.18826*

[4] *Red Electrica and MITECO reference*

Surplus renewable generation (GWh) [5]

Mainland Spain21 714 GWh **Mainland Spain** 0 GWh

7.3 % of total renewable produce

[5] *Surplus renewable generation not integrable in the system in the production or balancing markets*

Energy not supplied

0 hours

Variable cost (EUR/MWh):	*29.8— —*	*36.6 **
Marginal average cost (EUR/MWh):	*28.0— —*	*34.3 **
Other:		
Total synchronous additional gene cost min (MEUR):	568 — —*714 **	
Total annual cost of generation (MEUR):	9066— —	11129 *

[6] *EUR 2016 values*

(*) Higher value resulting from considering a gas price of EUR 10,5/GJ compared to the benchmark of EUR 7.5/GJ. The consideration of this value has a limited impact on the balance sheet.

Source: Red Eléctrica de España

PNIEC SCENARIO 2023-2030, HORIZON 2030

In addition, the methodology used and the results of the Spanish mainland system coverage studies for the PNIEC 2023-2030 horizon 2030 defined by MITECO for verifying supply in the scenario with regard to the coverage of demand are set out.

It also briefly describes the probabilistic uAlised methodology, which coincides with the methodology developed at European level in ENTSO-E206 for ERAA analyses (*E y Resource Adequacy Assessment*)207 and a description of the meaning of demand coverage indices.

In addition to the adequacy assessment, two publications of interest related to the adequacy assessment are listed: the European Coverage Report 2023, European Resource Adequacy Assessment, ERAA 2023,208 and the National Coverage Analysis of the Spanish Peninsular Electricity System209.

Probabilistic adequacy assessment methodology

Demand coverage refers to the capacity of the generation resources available to supply the electricity demand in the system at all times of the year of study and consists of the existence of sufficient resources for saAsfacer both consumer demand and the operational requirements of the electricity system. The calculation of this capacity to supply demand is done by determining the values corresponding to the study scenario of the different coverage indicators, which will be detailed below.

The coverage analysis in the PNIEC Scenario 2023-2030 horizon 2030 consists of verifying compliance with the system demand coverage criteria, using the probabilistic methodology defined by the European NormaAva210 and applied by ENTSO-E in the Medium Term Awareness Assessments (ERAA).

For the adequacy analysis, the same model as for the production of generation balances is used, although the model is paralysed to represent a set of climate years, in accordance with the probabilistic methodology.

The results of probabilist studies depend on a number of variables that can be considered independent of each other, mainly the unavailability of interconnections between neighbouring systems and the adventitious outages of the generating groups, and other climate-dependent variables, and which therefore cannot demand and capacity for hydraulic, photovoltaic and wind production.

The stochastic immersion dependent on the Acas variables is modelled by a series of 35 years of climate linked to ENTSO-E (1982-2016) within the scope of the ERAA.

Each selected calendar year consists of the combination of the meteorological variables recorded in that year relating to temperatures, wind, solar irradiation and the availability of hydraulic resources extrapolated to demand and renewable generation, taking into account the energy demand in an average year esAmada for each calendar year and the hydropower, wind and solar generation capacities in the PNIEC Scenario 2023-2030 for that year. With these data, hourly series are available for a full year of system demand and renewable generation with a profile corresponding to that year of Aco. The average demand over the 35 years is the demand for electricity on the mainland SAmada deterministic in the PNIEC Scenario 2023-2030 horizon 2030.

European206 Network of Transmission System Operators for Electricity.
207 Link: h \ ps://www.entsoe.eu/outlooks/eraa/
208 Link: h \ ps://www.entsoe.eu/outlooks/eraa/2023/eraa-downloads/
209 Link: h \ ps://www.ree.es/sites/default/files/01_ACTIVIDADES/Documentos/informe_os_nov23.pdf
210Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity.
ACER Decision of 2 October on the European Adequacy Assessment Methodology.

The stochastic uncertainty dependent on the fortuitous outages of the generation groups is modelled by Monte Carlo simulations, which randomly allocate the hourly patterns of unavailability of generators and interconnection lines, affecting the availability of generating groups in each hour. For each summer year in the series, 10 draws are simulated (N = 10), which represents a total of 350 outdated simulations for each hour of the year, i.e. the simulation of 350 years of possible Monte Carlo corresponding to the year 2 030 in the PNIEC Scenario 2023-2030.

For this probabilistic analysis, minimum frequency/power control reserves have been included in all European countries. Spain's power frequency control reserve is 2 400 MW.

The ualised tool for the determination of coverage indicators includes a market model simulation algorithm, which calculates marginal generation costs for different systems as part of a generation cost minimisation problem. This opmisation algorithm is used in the demand adequacy analysis for the determination of flows through the interconnections between the different systems by simulations that determine the calculation of the generation dispatch. These simulations uAlise as the basis for a perfect market for competition in electricity generation. The variable generation cost values are those used for the generation dispatch studies in the PNIEC 2023-2030 scenario for 2030.

The final part of this annex includes the details of the different assumptions used for the coverage analysis of the PNIEC 2023-2030 scenario for 2030.

Demand coverage indicators

The coverage of demand consists of the existence of sufficient resources for saAsfacer both consumer demand and operational demands of the electricity system. As a measure, the so-called coverage indices or indicators are used:

Expected value of energy not supplied (EENS) [MWh/year or GWh/year]

EENS is the annual average of the energy not delivered by the generation system, due to a higher demand value than the available generation and import capacity together with the availability of generation in neighbouring systems. This is a forecast indicator for non-delivered energy referred to in paragraph 5 (j) of Regulation (EU) 2019/943 of 5 June 2019 on the internal electricity market.

In the coverage studies with the methodology described, the expected value of energy not supplied (EENS) is assessed as a sAmation from a certain number of simulations of possible scenarios. To this end, EENS is a measure of security of supply forecasting, and it is mathematically described as follows:

$$EENS = - \text{powering}\ ENS_{!} \quad NA_{\#^{7}}$$

where ENS_j is the energy not delivered in system j (j appendix S), associated with a loss of load event from simulation j_{to} Monte Carlo, and where N is the number of Monte Carlo simulations considered.

Expected Load Loss (LOLE) [h/year]

LOLE is an expected average value of the number of hours per year in which available generation and imports cannot meet the demand of a system. This is a loss of load forecast indicator referred to in paragraph 5 (j) of Regulation (EU) 2019/943 of 5 June 2019 on the internal electricity market.

$$LOLE = 1\ \text{grams}\ TM > Y \quad N_{do\ I\ am\ \#^{J}}$$

where LLD_j is the duration of the loss of load of system j (j appendix S), associated with a loss of load event from simulation j_{to} Monte Carlo, and where N is the number of Monte Carlo simulations considered.

Note that the LLD for Monte Carlo's $j_{simulation}$ can only be reported as a whole number of hours due to the time resolution of the simulation. Therefore, it does not reflect the severity of the deficiency or the duration of the loss of cargo within that time.

Probability of Load Load (LOLP) [%]

LOLP measures the probability of not saAsfacer all demand with generation and imports available within a defined Aempo period.

$$LOLP = \frac{LOLE}{--H}$$

where h corresponds to the number of hours in the Aempo period under study, usually one year.

2030 Horizon 2030

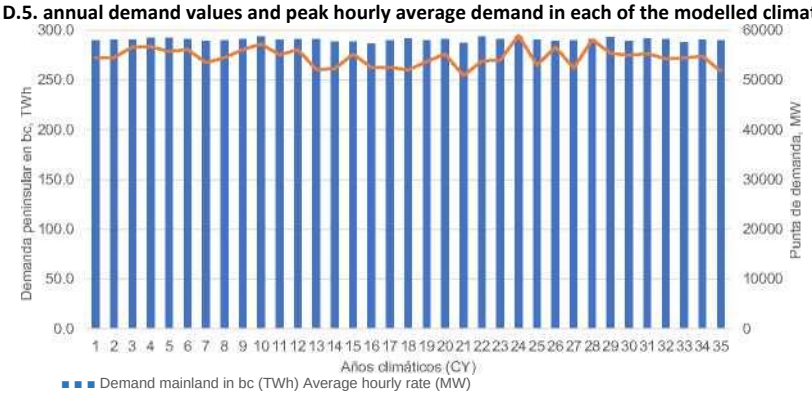
The assumptions of the study have generally been set out in section D.1, so this section indicates the additional assumptions in the coverage study.

Years clima $cos considered

It has been considered that 35 years have been taken into account in the period between 1982 and 2016. Profiles of

uAlised demand and peak demand are shown in Figure D.7.

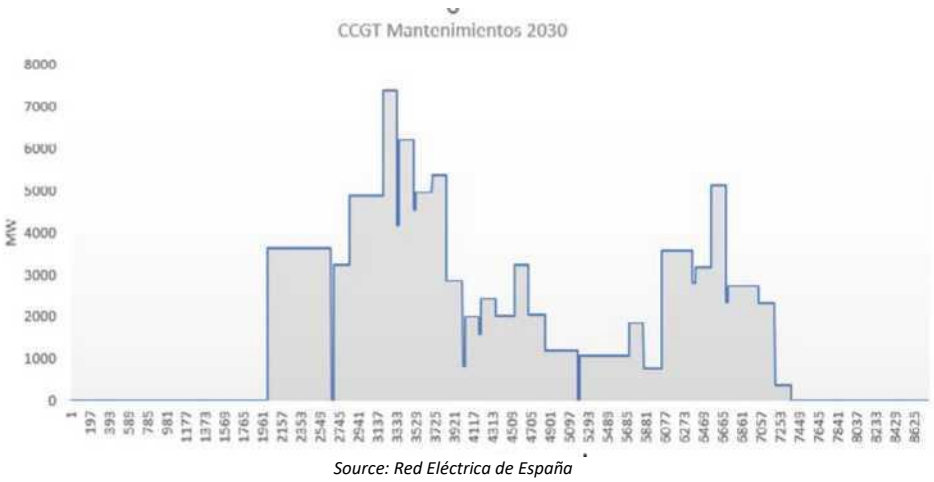
Figure D.5. annual demand values and peak hourly average demand in each of the modelled climate years



Source: Red Eléctrica de España

Generation outages considered

An incidental unavailability value in each of the modelled thermal groups of 5 % of the Aempo isconsidered. In the case of Spain, this value is maintained for the cycles, the value for nuclear units being 3 %. In addition to this value, scheduled maintenance in the different nuclear and combined thermal units is considered. Figures D.8 and D.9 show the number of hours for which a certain number of nuclear or combined cycle units have been modelled simultaneously unavailable due to planned outages.



Source: Red Eléctrica de España

Figure D.7. Planned nuclear outages

Source: Red Eléctrica de España

Outages of interconnections considered

In general, the model considers a planned and accidental unavailability of interconnections according to the information provided by each TSO. In the case of Spain, the NTC values already take into account these fault and maintenance rates.

The results of the values corresponding to the coverage indicators of the analysis of the PNIEC Scenario 2023-2030 horizon 2030 are shown in Table D.8. This table shows the total demands in plant bars taken into account in each calendar year, the peak demand value, and the values of the coverage indices EENS (Unsupplied Energy Esperanza), LOLE (annual expected hours with loss of load) and LOLP (annual probability of loss of load).

The results obtained from the coverage analysis of the Spanish mainland system for this PNIEC 2023-2030 scenario for 2030 indicate that the coverage of demand is ensured, with no risk being observed

in the years analysed.

For the purposes of this analysis, a LOLE value of 0.94 hours has been considered for the mainland electricity system, as set out in the proposal for a resolution of the Directorate-General for Energy Politics and Mines setting the values of the value of lost load and the reliability standard211.

It can thereforebe concluded that with the demand and generation scenarios in the PNIEC 2023-2030 scenario for 2030 and the methodology used, the Spanish electricity system is very reliable in terms of covering demand for single knots. This is in line with the results obtained in the European analysis of ERAA 2023 and ERAA 2022, as well as those in the national coverage report mentioned above. However, these adequacy assessment exercises reflect the importance of compliance with the Objectives set out in the NECP in order to maintain the desired level of security of supply. In other words, any change in the generation or storage installed capacity assumptions may have an impact on the results of the adequacy assessments.

211 Link: httpsendeavour//www.miteco.gob.es/content/dam/miteco/es/energia/files-1/_layouts/15/Propuesta%20de%20Resoluci%C3%B3n-68419.pdf

PNIEC scenario 2023-2030 horizon 2030. Base case. Spain

	Demand		Coverage indicators		
	Total demand (TWh)	Tip (GW)	EENS (MWh/year)	LOLE (h/year)	LOLP (%)
1982	290	54	0	0	0 %
1983	291	55	0	0	0 %
1984	291	57	0	0	0 %
1985	293	57	0	0	0 %
1986	292	56	0	0	0 %
1987	291	56	0	0	0 %
1988	289	54	0	0	0 %
1989	290	54	0	0	0 %
1990	291	56	0	0	0 %
1991	294	57	0	0	0 %
1992	291	55	0	0	0 %
1993	291	56	0	0	0 %
1994	291	52	0	0	0 %
1995	288	52	0	0	0 %
1996	289	55	0	0	0 %
1997	287	53	0	0	0 %
1998	290	53	0	0	0 %
1999	292	52	0	0	0 %
2000	290	54	0	0	0 %
2001	291	55	0	0	0 %
2002	287	51	0	0	0 %
2003	294	54	0	0	0 %
2004	291	54	0	0	0 %
2005	294	59	0	0	0 %
2006	291	53	0	0	0 %
2007	289	57	0	0	0 %
2008	290	52	0	0	0 %
2009	291	58	0	0	0 %
2010	293	55	0	0	0 %
2011	289	55	0	0	0 %
2012	292	55	0	0	0 %
2013	292	54	0	0	0 %
2014	288	54	0	0	0 %
2015	291	55	0	0	0 %
2016	290	52	0	0	0 %
Mean value			**0**	**0**	**0 %**

Source: Red Eléctrica de España

ANNEX E. CONTRIBUTION OF THE PLAN TO THE SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA

ANNEX E. CONTRIBUTION OF THE PLAN TO THE OBJECTIVES OF SUSTAINABLE DEVELOPMENT OF THE 2030 AGENDA

On 25 September 2015, the UN Assembly adopted the 2030 Agenda for Sustainable Development, an opportunity for countries and their societies to embark on a new path to improve everyone's lives, leaving no one behind.

The Agenda has **17 $Lives on Sustainable Development**, ranging from the elimination of poverty to the fight against climate change, education, gender equality, environmental protection or the design of our cities.

Objectives Agenda 2030

The Kingdom of Spain undertook, within the United Nations, to implement the 2030 Agenda. In this spirit, on 29 June 2018, at the proposal of the High Level Group on the 2030 Agenda, the Council of Ministers approved the **"Action*Plan for the Implementation of the 2030 Agenda: Towards a Spanish Sustainable Development Strategy*"**. The plan highlights Spain's commitment to Agenda 2030 and the need for it to be a reference for all public policy areas.

EU Regulation 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action was adopted on 11 December 2018.

ANNEX E. CONTRIBUTION OF THE PLAN TO THE SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA

In accordance with the mandate of the Regulation on the Governance of the Energy Union and Climate Action, the **NECP 2021-2030** was drafted and approved by the Council of Ministers on 16 March 2021 and published in the Official State Gazette on 25 March 2021.

The NECP responds to the EU's climate action objections without neglecting the response to the commitment to the 2030 Agenda. In this regard, it is an instrument that is ready to contribute primarily to the achievement of Objectives No 7 **'Affordable and clean energy',** and No **12 'Climate Action'**, as well as having a significant impact on others, such as: objective 3 '**Health and well-being'**, No 8 '**Decent work and economic growth'**, No 9 '**Industry and Innovation'**, No 11 '**Sustainable cities**

and communities' or No 15 '**Life on land'**.

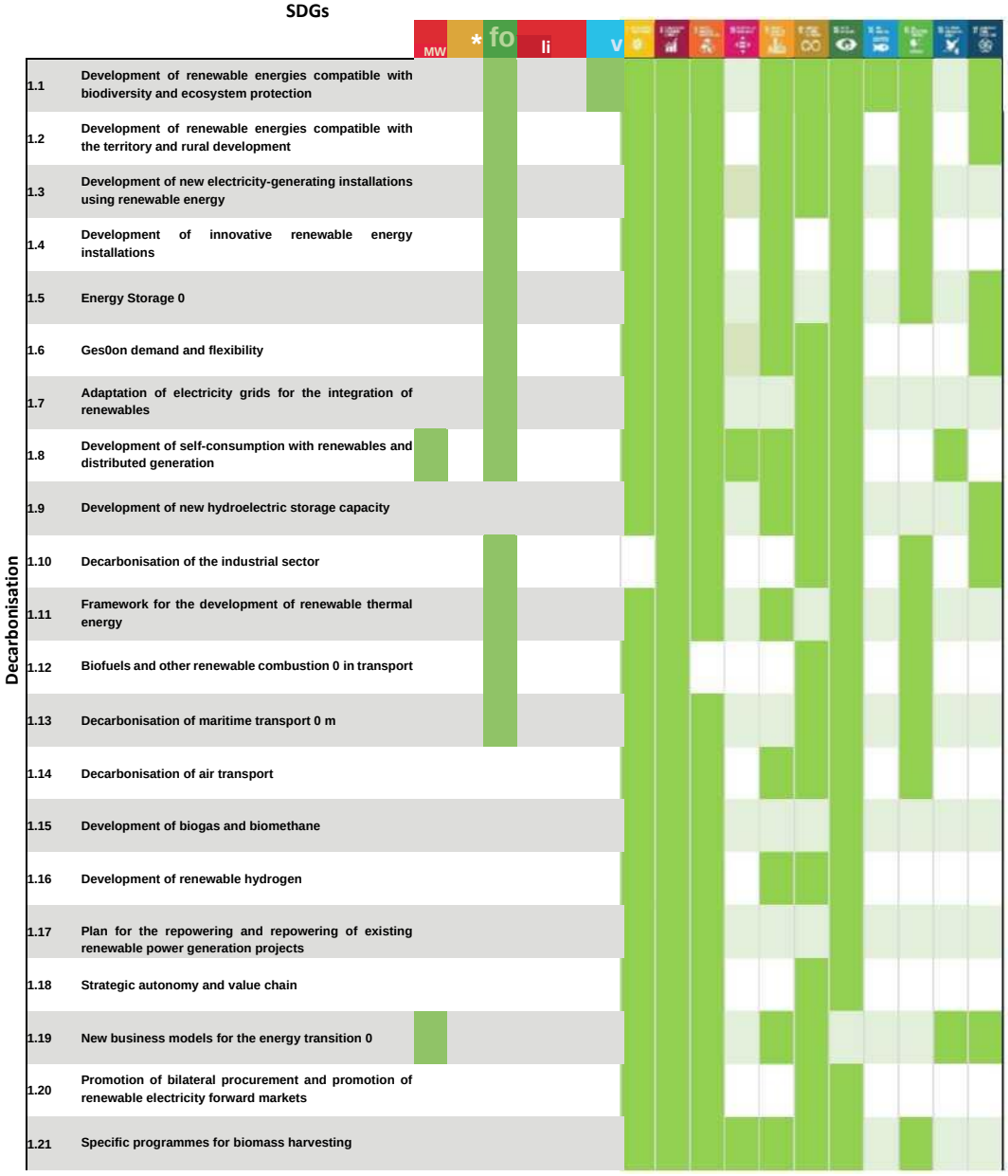
In order to give renewed impetus to public policy areas, once almost half of the deadline for achieving the objectives of the agenda had been reached, the **2030 *Sustainable Development Strategy was approved by the Council of Ministers on***5 June 2021, which poses a number of challenges in the country, including **Challenge No 2: Addressing the climate and environmental emergency fully** refers to the scope of action and competence of the NECP in areas as important as GHG emission reduction, air pollution or energy efficiency.

This is why the process of updating the NECP, which is carried out in compliance with Article 14 of the Regulation on the Governance of the Energy Union and Climate Action, introduces a renewed package of measures, which, among other objectives, contribute to progress towards achieving the 17 SDGs set out in the 2030 Agenda.

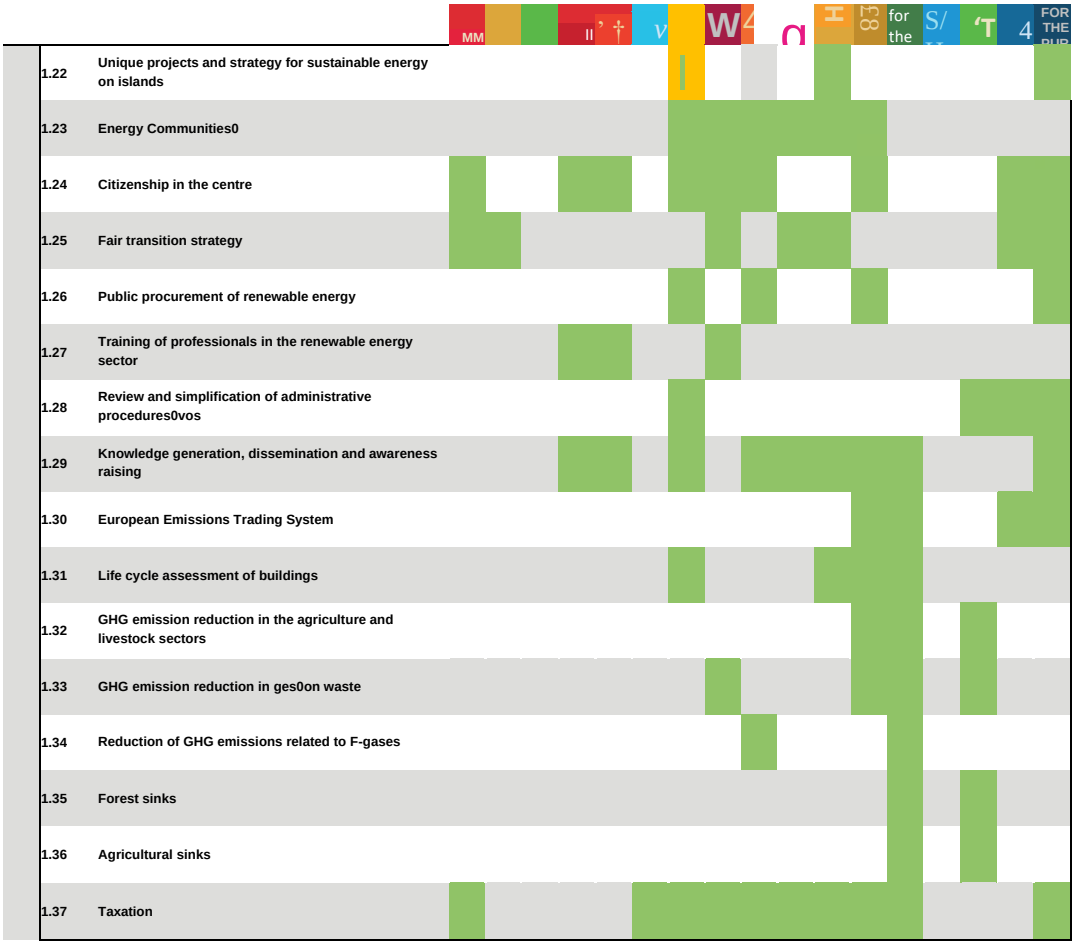
Table E.1 below summarises the specific contribution of the measures envisaged in the revision of the NECP to the SDGs.

ANNEX E. CONTRIBUTION OF THE PLAN TO THE SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA

Table E.1. Interactions between the NECP and the SDGs



ANNEX E. CONTRIBUTION OF THE PLAN TO THE **SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA**



ANNEX E. CONTRIBUTION OF THE PLAN TO THE **SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA**

Energy Efficiency Jca

2.1 Low-emission zones and sustainable urban mobility

2.2 Modal shift in freight transport with a higher presence of rail

2.3 Renovation of rolling stock of means of transport with more efficient ones and improvements in ges0on

2.4 Improving the energy efficiency 0of ports

2.5 Promotion of electric vehicles

Improvements in Ges0on Process Technology and Systems of Non-Energy-Intensive Industries

2.6 Improvements in ges0on process technology and systems in energy-intensive industries

2.7 Energy efficiency 0 in existing buildings in the residential sector

Renewal of residential equipment

2.8 District heating and cooling networks in the residential sector

2.9 Energy efficiency 0 in buildings in the tertiary sector

2.10 District heating and cooling networks in the tertiary sector

2.11 Energy efficiency 0 in cold generating equipment and large climate buildings0the tertiary sector and public infrastructure

Energy efficiency 0 in farms, irrigation communities and agricultural machinery

2.12 Energy efficiency 0 in the fisheries sector

2.13 Promotion of Energy Performance Contracts 0

2.14 Public sector: proactive Liability 0va and Energy Efficient Procurement 0

2.15 Energy Audits 0 and Ges0Energy Systems 0ca

Training professionals in the energy efficiency sector0

2.16 Communication and information on energy efficiency 0

2.17 Other measures to promote energy efficiency 0: the transition in high-efficiency cogeneration

2.18 Measures financial: National Energy Efficiency Fund 0ca

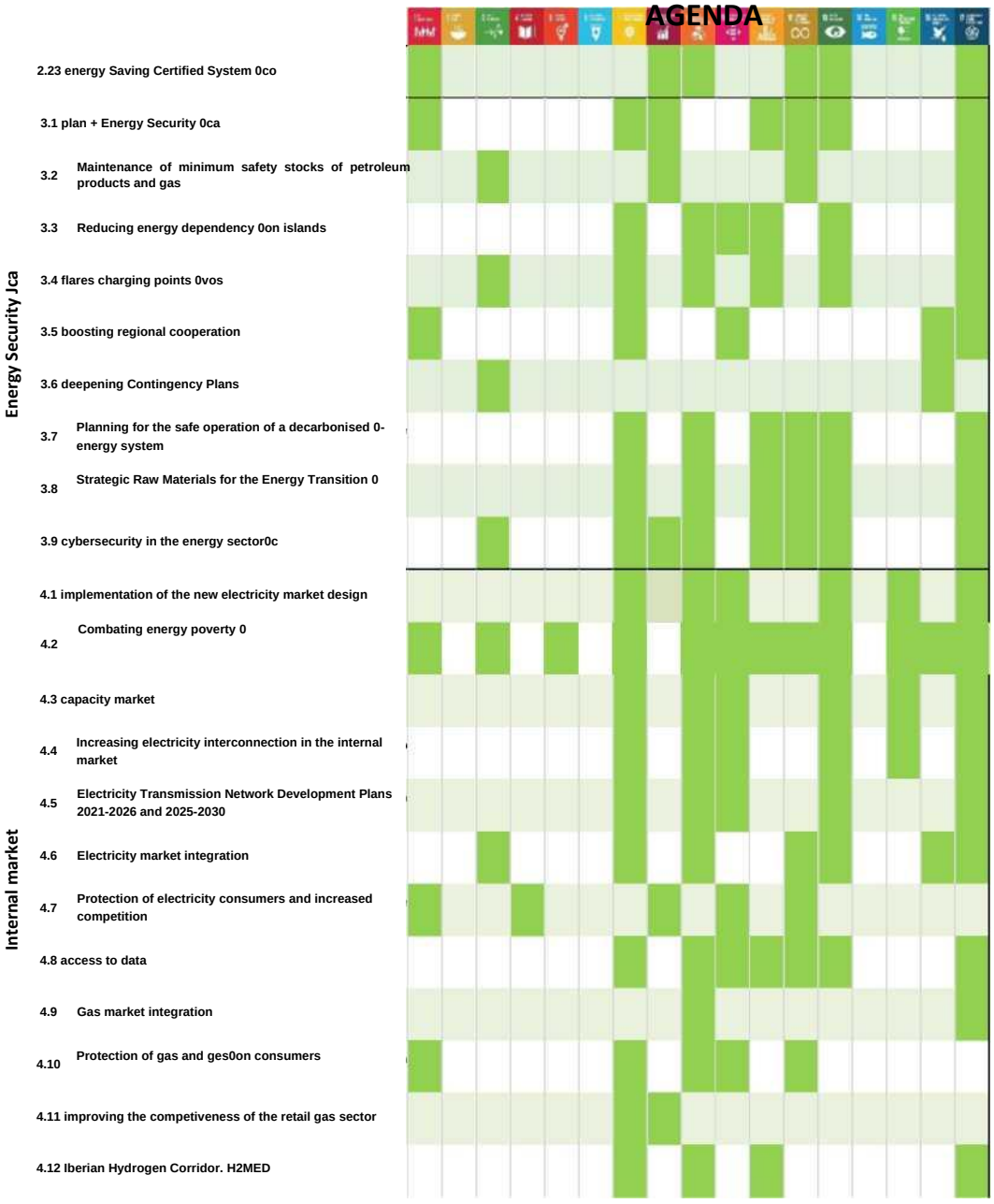
2.19

2.20

2.21

2.22

ANNEX E. CONTRIBUTION OF THE PLAN TO THE **SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA**



ANNEX E. CONTRIBUTION OF THE PLAN TO THE **SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA**

4.13 local electricity markets

5.1 Strategic action on climate, energy and mobility

5.2 Implementation of the SET-Plan

5.3 Complementary energy and climate plans

5.4 Scientific and technical infrastructure in the energy and climate sectors ₅ 5 Public Purchase of Innovative Technology (CPTI) and CommercialPre **(PPP)**

5.6 Strengthening public venture capital for technology transfer in energy and climate

5.7 Norma0 modifications to facilitate inves0innovator ac0gor

5.8 Promoting public-private partnerships

₅ 9 invesing0centres of comparable 0-tularity in renewable energy

5.10 Promoting an Energy Innovation Pole renewables, storage and hydrogen at the City of Energy Foundation, CIUDEN

5.11 Improving SECTI governance and coordination

Strategic Projects for Recovery and 5.12 Economic Transformation (PERTE) in energy transition0

5.13 ALINNE Technology Platforms and Alliance

5.14 Enhancing the internationalisation of SECTI actors in the field of energy and climate

5.15 Spanish contribution to R & D & I for fusion energy

5.16 mission Innova0on 2.0

5.17 European financing mechanisms for energy and climate innovation

5.18 Regulatory test bank in the electricity sector

Aspects Invesiga

6.1 gender perspective

6.2 Integration of Objectives for Adaptation to Climate Change 0co

6.3 Integration of the 0th Objectives of the National Air Pollution Control Programme

ANNEX E. CONTRIBUTION OF THE PLAN TO THE **SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA**

6.4	Mecanismo de Recuperación y Resiliencia				■	■		■	■	■	■	■	■	■				■
6.5	Fondo de Transición Justa	■			■	■		■	■	■	■	■	■	■				
6.6	Fondo Social para el Clima	■										■	■	■				■
6.7	Política Agrícola Común											■	■	■		■		■
6.8	Política de Cohesión	■						■			■	■		■				■
6.9	Evaluación ambiental			■	■		■	■	■	■		■	■	■	■	■		■
6.10	Reto demográfico	■				■			■	■	■	■						■
	Totales	21	1	28	21	12	4	84	54	83	31	64	68	87	4	29	18	76

ANNEX F. MEASURES AND METHODOLOGY FOR IMPLEMENTING ARTICLE 8 OF THE ENERGY EFFICIENCY DIRECTIVE

F.1. OBJECTIVE

The purpose of this Annex is to provide the information requested by both Annex V to the Energy Efficiency Directive212 (hereinafter EED) and Annex III to the Governance Regulation, providing a greater level of detail of the policies and measures described in the NECP, as well as the methodology adopted, the implementation of which will enable the energy savings obligation to be achieved for the period 2021-2030, in accordance with the provisions of Article 8 of the EED.

F.2. BACKGROUND

The energy savings obligation, set out in Box 8 of the Energy Efficiency Directive, provides that Member States shall achieve **cumulative end-use energy savings**, at least equivalent to achieving new savings each year from 1 January 2021 to 31 December 2030 of a given percentage of annual final energy consumption, averaged over three years prior to 1 January 2019. This percentage is gradually increased over the years of the obligation period, as follows:

- 0.8 % by2021 – 2023
- 1.3 % by2024 – 2025
- 1.5 % by2026 – 2027
- 1.9 % by2028 – 2030

The new value of the cumulative final energy savings objection for the period 2021-2030 is increased, on average, by 1.49 % compared to the value of the Avo for the same period set out in the 2012 Energy Efficiency Ava213Directorate, resulting in 53.593 ktoe.

It should be noted that this would be the value of the cumulative final energy savings objection in the case where the calculation base reduction mechanisms and the permissible flexibilities as provided for in Article 8 (7), (6) and (8) EED are not applied.

In this regard, it should be **pointed out that Spain will take advantage of and apply all the flexibility mechanisms lost by the direc $va** (Article 8 (6), (7) and (8)), whenever possible, i.e. provided that it meets the objective of saving years 2021, 2022 and 2023 (676 ktoe/year or a cumulative 2030 of 18.252 ktoe). In such a case, and in accordance with the provisions of DirecAva, the flexibilities will apply only to the first three years of the obligation period and the **discounted value of the $vo of cumulative final energy savings will be calculated, which would be declared in the next revision of the NECP**.

Despite the restriction in the years of application, the result on the value resulting from the objection will have a considerable impact, as they are the years with the highest multi applicator effect and, therefore, the years that contribute most to the calculation of the cumulative value of

212**DirecMva (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)**.

213**Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.**

savings.

In no case, in accordance with the provisions of Article 8.9, the flexibilities applied may, taken together, lead to a reduction of more than 35 % of the energy saving capacity calculated in accordance with paragraphs 6 and 7.

In any event, in order to achieve the objective of final energy savings for the period 2021 to2030, as in the previous period 2014-2020, a combination of the two systems permitted by the Directive has been chosen:

- An energy efficiency obligation scheme in accordance with Article 9 of the EED. Law 18/2014 of 15 October 2015 approving urgent measures for growth, competitiveness and efficiency regulates and creates the National System of Adequacy Obligations and, within the SNOEE, the National Energy Efficiency Fund, and, as a result, the CAE, regulated by Royal Decree 36/2023 of 24 January 2007.
- Adoption of alterative policy measures, such as taxation, regulation or voluntary agreements, among others; in accordance with Article 10 of the EED.

Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery amended the aforementioned Law 18/2014 of 15 October, extending the period of validity of the SNOEE until 31 December 2030, in accordance with the provisions of Directive (EU) 2018/2002 amending the 2012 Energy Efficiency Directive.

F.3. CALCULATION OF THE LEVEL OF ENERGY SAVINGS OBLIGATION 20212030

This section provides a description of the calculation of energy savings to be achieved over the whole period from 1 January 2021 to 31 December 2030. The calculation was made, in accordance with point (b) of the first subparagraph of paragraph 1 of Article 8 of the EED, to stop the annual final energy consumption (in ktoe), averaged over the three years prior to 1 January 2019 and using the Eurostat statistical data. The breakdown of annual final energy consumption for the years 2016, 2017 and 2018 is given in the following table:

Table F.1. Final energy consumption for the years 2016, 2017 and 2018 and average (ktoe)

Annual FINAL ENERGY CONSUMPTION (ktoe)		
2016	**2017**	**2018**
82.207	84.753	86.720
AVERAGE		**84.560**

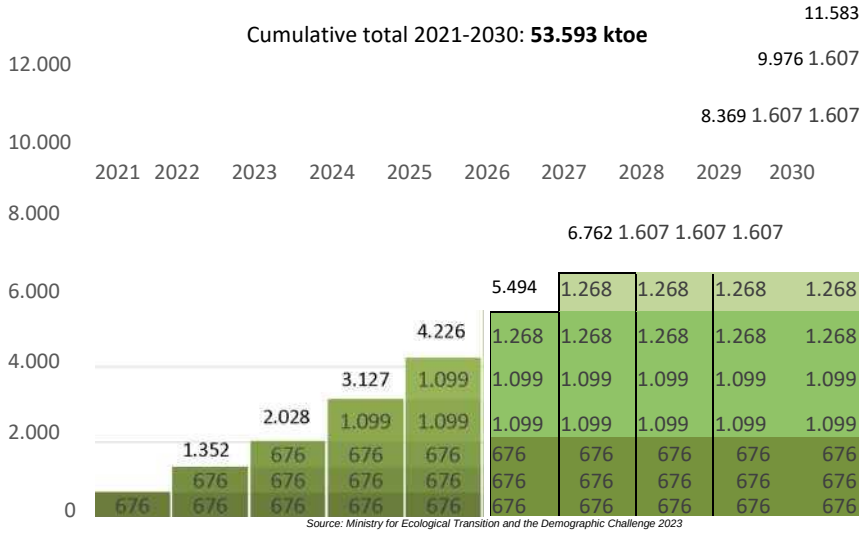
Source: Eurostat, consolidated data as at 22 January 2023

ParAendo of these annual consumption, the objective of cumulative final energy savings is calculated by applying incremental percentages in a phased manner for the previous years of the period:

- 0.8 % for 2021-2023, which is an objection of annual savings of 676 ktoe
- 1.3 % by2024-2025, with an increase in the objection to 1.099 ktoe per year
- 1.5 % by2026-2027, which represents an objection of annual savings of 1.268 ktoe
- 1.9 % by2028-2030, which represents an objection of annual savings of 1.607 ktoe

Finally, the total cumulative volume of final energy savings for the period 20212030 would amount to 53.593 ktoe, in the event that none of the flexibilities provided for in Article 8 (7), (6) and (8) EED apply. The following figure shows the distribution of savings in the period according to the proposed new Objectives:

Figure F.1. Cumulative interim objective of final energy savings: 2021 – 2030



Source: Ministry for Ecological Transition and the Demographic Challenge 2023

First of all, it should be noted that, although this document sets out the savings path and the set of measures that will have to be put in place in order to achieve this, Spain intends to use and apply all the flexibility and reduction mechanisms for the calculation basis provided for in Article 8 (6), (7) and (8) of the EED whenever possible, i.e. provided that it reaches the 2022, 2021 and 2023 saving objective (676 ktoe/year or a cumulative 2030 of 18.252 ktoe).

Calculation of the percentage of the $vo of cumulative final energy savings to be derived from actions in my $$Energy poverty $ca

Section 8 of Section lays down the **obligation, in the third subparagraph of paragraph 3 thereof, to obtain part of the $vo cumulative final energy savings from vulnerable households or households in energy poverty $ca.**

The percentage of cumulative energy savings that must come from energy poverty measurement measures is calculated as the arithmetic average of the following four indicators:

- *inability to maintain the dwelling at an appropriate temperature (Eurostat, SILC [ilcappendix mdes01]);*
- *arrears in the payment of utility bills (Eurostat, SILC [ilcoutlining mdes07]);*
- *the total population living in dwellings where the roofs are leaked or where walls, floors or foundations are humane, or whose window frames or floor are rotary (Eurostat, SILC, [ilcoutlining mdho01]);*
- *at-risk-of-poverty rate (Eurostat, SILC and European Community Household Panel surveys [ilc-li02]) (cut-off rate: 60 % of median equivalised income after social transfers.*

The value of each of these indicators, referring to Spain for 2019, as required by Article 8.3 of the direcAva, was obtained from the Eurostat database:

Table F.2. Energy poverty indicators for 2019

Indicator	Eurostat link	Value
Inability to keep home adequately warm	Eurostat, SILC [ilcoutlining mdes01]	7,5
Arrears on utility bills	Eurostat, SILC [ilcoutlining mdes07]	6,5
Total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor	Eurostat, SILC, [ilcappendix mdho01]	14,7
Rate of poverty risk	Eurostat, SILC, [ilc-li02]214	20,7
	Arithmetic mean of indicators	**12,35**

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

Thus, the arithmeAc average of the indicators gives a value of 12,35 **%**, which means that, if the reduction mechanisms referred to in the previous paragraph are not applied, the total of the cumulative final energy savings objection (53.593 **ktoe) should come from actions aimed at my $ca energy poverty or at vulnerable $vos**.

In order to achieve this minimum quota, the following measures can be mentioned for the time being, which have already been put in place or are being designed:

- The National Strategy against Energy Poverty (ENPE) 2019-2024215 integrates actions in the Public Policy Issues to combat energy poverty and ensure effective access to energy for all citizens. Among the measures included in this Strategy, the following should be highlighted:
  - MEDIDA 7. Express renovations in dwellings, with certain low-cost and rapid implementation measures.
  - MEDIDA 9. Suspension of equipment by more energy efficient ones.
  - MEDIDA 10. Comprehensive renovation of buildings, seeks to promote measures aimed at buildings in urban regeneration and renewal areas or in rural areas with vulnerable consumers.
  - MEDIDA 17. Information on consumption habits, energy savings and improved

214 **Cut-off percentage: 60 % of median equivalised income after social transfers**
215 National Strategy against Energy Poverty 2019-2024
2.11 energy efficiency in buildings in the tertiary sector

energy efficiency.

- In the context of the National System of Aca Energy Efficiency Obligations, mechanisms have been introduced to take into account and enhance actions aimed at targeting energy poverty and helping vulnerable households. In this way:
    - Within the Aco Certified Energy Saving System, multi-application coefficients have been introduced for energy savings from energy efficiency actions that have been carried out to address situations of energy poverty or that have been aimed at supporting vulnerable collectors, people in low-income households or, where applicable, people living in social housing;
    - The Strategy of the National Energy Efficiency Fund for the period 20242026 establishes, among the criteria for selecting and designing new aid programmes under that fund, that have a component of targeting energy poverty or supporting vulnerable social collections.
- In the area of the Social Climate Fund, its plans shall set out measures to achieve a just energy transition through support mechanisms for those most affected by energy poverty. Therefore:
    - Structural measures to reduce energy demand Aca for dwellings inhabited by vulnerable consumers.
    - Support the decarbonisation of heating and cooling of buildings.
    - GaranArising access to zero- and low-emission mobility and transport for vulnerable consumers.

- Temporary measures to support lower incomes as a thermal or electricity social bond.

F.4. SECTORAL DISTRIBUTION OF THE ENERGY SAVINGS TARGET

Chapter 3.2.1 of the NECP relates to 'Measures for compliance with the energy savings obligation. Sectoral approach' proposes a sectoral distribution of the cumulative final energy savings objection for the whole period, amounting to 53.593 ktoe, among the five energy-consuming sectors: transport, industry, residential, tertiary and agriculture and fisheries.

15 large groups of sectoral energy efficiency measures have been designed and 8 more horizontal $energy efficiency measures, which in turn are divided,depending on the instrument used, into sub-measures in such a way as to meet such an ambitious cumulative final energy savings objective (the cumulative final energy savings objection for the period 2021-2030 is 3,4 times higher than the cumulative saving objective of the previous period 2014-2020).

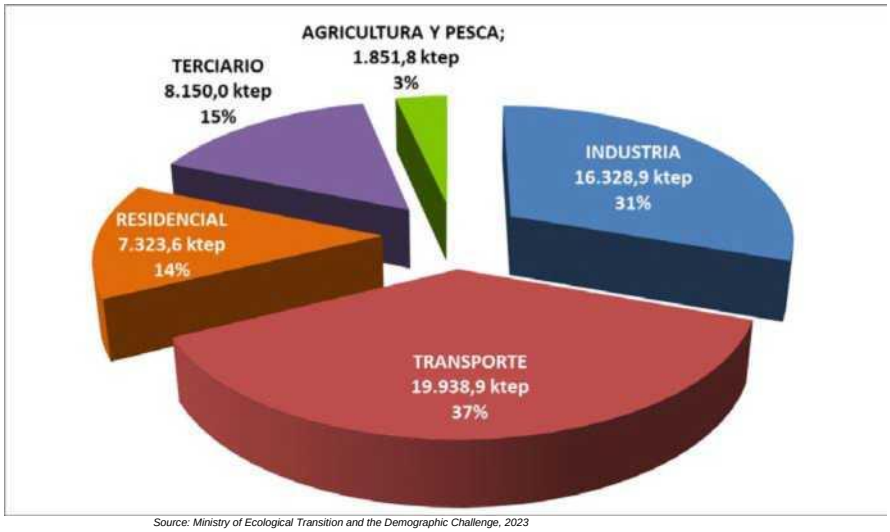
Forthe current obligation period 2021-2030, the Ministry for the Ecological Transition and the Demographic Challenge has made a forecast in which it is expected that the transport sector will contribute most to the objective of cumulative final energy savings for the period 2021-2030, assigning it a saving objection of 19.938,9 ktoe, which represents 37 % of the cumulative energy savings objection in the period. It is followed by the industrial sector, with a cumulative saving objection of 16.328,9 ktoe for the period, which represents 30 % of the Avo objection. At the same time, the tertiary sector Aene has a saving objection of 8.150,0 ktoe, which represents 15 % of the total savings. The residential sector Aene has a saving objection of 7.323,6 ktoe, accounting for 14 % of the total. The agriculture and fisheries sector represents the lowest contribution with 1.851,8 ktoe (3 %) of cumulative savings. The graphic representation of this distribution is shown in the following figure:

Table F.3. Energy efficiency measures for the period 2021-2030 (ktoe)

2.12	District heating and cooling networks in the tertiary sector	399,8 ktoe
2.13	Energy efficiency in cold generating equipment and large climate heating installations in the tertiary sector and public infrastructure	4.388,7 ktoe
AGRICULTURE AND FISHERIES		1.851,8 ktoe
2.14	Energy efficiency in farms, irrigation communities and agricultural machinery	1.296,3 ktoe
2.15	Energy efficiency in the fisheries sector	555,6 ktoe
		53.593,1 ktoe

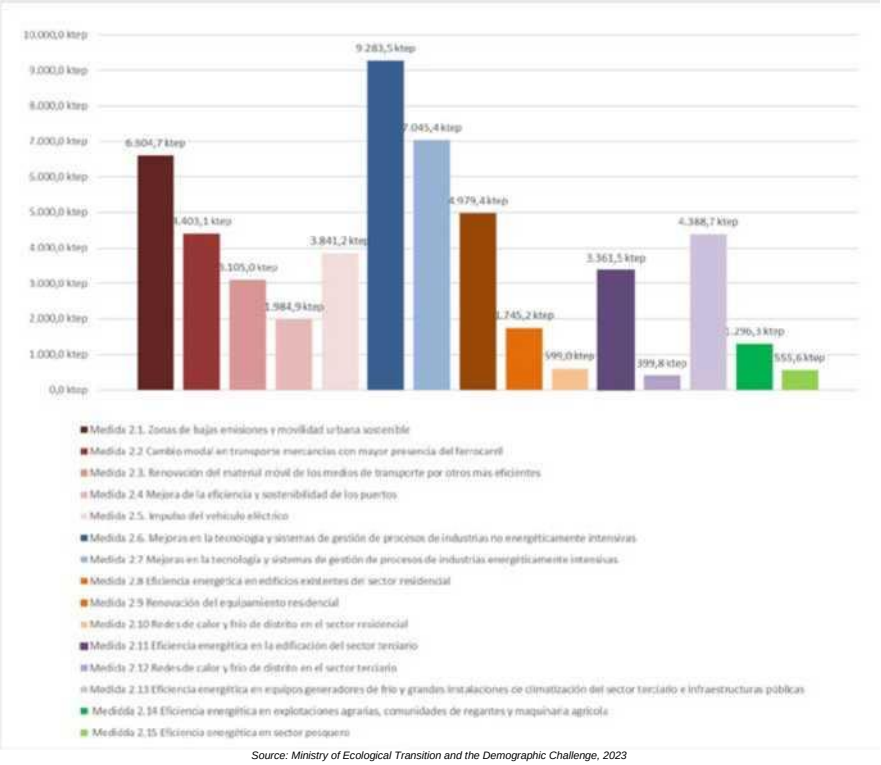
Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Figure F.2. Cumulative final energy saving by Sector in Spain 2021-2030 (ktoe)



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Figure F.3. Cumulative final energy savings by measures in Spain 2021-2030 (ktoe)



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

F.5. POLICY MEASURES FOR COMPLIANCE WITH THE ENERGY SAVINGS OBLIGATION

Section 2 of the Energy Efficiency Directory provides Member States with two options to achieve cumulative end-use energy savings: either through an energy efficiency obligation scheme or by adopting alterative policy measures. It is also possible to opt for a combination of the two.

As for the period 2014-2020, a combined system is maintained and will be maintained for the period 2021-2030, albeit with adjustments and new measures to achieve the ambitious final energy savings objective of the current obligation period. At the same time, the specific proposal for action for this period has been drawn up:

F.5.1. Energy Efficiency Obligation Scheme Aca

During the period 2021-2030, **the** SNOEE and, within it, the **FNEE** will be maintained, both initiated by Royal Decree-Law 8/2014 of 4 July approving urgent measures for growth, competition and efficiency, and subsequently converted into Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency. The SNOEE was extended until 31 December 2030 by Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and other areas for economic recovery.

Article 71.2 of Law 18/2014 of 15 October gives the Government the power to regulate a system

of accreditation of final energy savings by issuing certified energy savings, which, once in place, allows those obliged to comply with their energy savings obligations partially to meet their energy savings obligations at the lowest possible cost, by carrying out or promoting, directly or indirectly, energy efficiency measures in various sectors. These Aco Certified Energy Savings (CAE) must reflect the annual final energy consumption savings recognised as a result of the investments made in energy efficiency actions, which must comply with the principles and methodology for calculating energy savings set out in Annex V to Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), so that they can subsequently be counted towards compliance with the cumulative final energy savings objective laid down in Section 8 of that Directive.

On 25 January 2023, Royal Decree 36/2023 of 24 January establishing an Aco Certified Energy Saving System was published. This new mechanism is expected to make a qualitative leap forward Avo and AtaAvo in achieving savings by the SNOEE, in order to amortise the impact of the significant increaseAvo on the objective of cumulative final energy savings for the period 2021-2030.

1. Description of the National Ecological Efficiency Obligations System

For the period 2021-2030, the annual savings objection, the percentages for **the distribution of annual savings $vo among the obligated parties,** as well as the resulting savings fees or obligations and their **financial equivalence**, shall be set annually **by order of the $tular of the Ministry for the Ecological Transition and the Demographic Challenge, subject to the agreement of the Government Executive Committee for Economic Affairs**.

The annual energy savings objection to be determined shall be repaired between obligated parties proportionally, in the case of gas and electricity traders, to the volume of their domestic final energy sales to final consumers in the second year preceding the annual obligation period. For wholesale operators of petroleum products and liquefied petroleum gases, the volume of their domestic final energy sales for subsequent retail distribution and final consumers, during the second year preceding the annual obligation period.

Until the entry into force of the Certified Energy Saving System (CAE scheme), obligated parties must ensure compliance with the annual share of energy savings, also referred to as the annual savings obligation, by making a financial contribution to the EEEF for the amount obtained **by** applying their annual savings obligation to an established financial equivalence.

However, as soon as this system becomes operational, it will be possible for those obliged under the SNOEE who so wish to contribute to meeting their annual savings obligation by submitting PPAs, while respecting a minimum mandatory contribution to the EENF, which will be established annually by ministerial order.

For Annulment, more details are provided for both the EENEE and the energy saving cervifications:

a) <u>Energy Efficiency National Fund: ca</u>

The NEEF was approved by Article 72 of Law 18/2014 of 15 October and is the only mechanism in force within the SNOEE during the period 2014-2020. As mentioned above, it will be maintained for the current period 2021-2030, albeit in combination with the Aco Certified Energy Saving System.

The EEEF is dedicated to financing economic, financial, technical assistance, training, information

or other measures to increase energy efficiency in the various energy-consuming sectors so that they contribute to achieving the national energy saving objective set out in Article 8 of the EED.

The obligated parties must make an annual financial contribution to the EENF, for the amount resulting from multi Application of their annual savings obligation for the financial equivalence to be established. This contribution shall be paid for full quarters in four equal parts at the latest by 31 March, 30 June, 30 September and 31 December of each year.

Financial equivalence is determined annually by order of the Atular person of the Ministry for the Ecological Transition and the Demographic Challenge based on the average cost of mobilising the investments needed to implement the energy saving and efficiency actions designed to achieve the annual objective of energy savings in all sectors (transport, industry, etc.). Given the difficulty of mobilising new investments, it is necessary to review financial equivalence on a regular basis.

Article 73 of Law 18/2014 of 15 October assigns the supervision and control of the FNEE to a Monitoring and Control Committee attached to MITECO, through the State Secretariat for Energy, and assigns the Fund's remit to the InsAtuto for the Diversification and Saving of Energy (IDAE).

The Fund shall continue to be equipped with:

- Contributions from the parties bound by the National System of Energy Efficiency Obligations in respect of fulfilling or settling their savings obligations. Despite the entry into operation of the PPA scheme, and in order to ensure sufficient funding, the minimum percentage of their annual obligation that obligated parties must necessarily be provided with financial contributions to the fund will be established.
- Resources from the ERDF Community structural funds.
- Other contributions entered in the General State Budget.
- Any other resources refused to finance actions that have as their object the implementation of final energy saving measures.

b) <u>Cae, Cer: energy saving codes:</u>

Section 11 of the Energy Efficiency Directory allows obligated parties to count against their obligation the specified energy savings obtained by energy **service providers $cos or other third** parties, including where obligated parties promote measures through other bodies authorised by the State or public authorities that may involve formal partnerships and can be combined with other sources of financing. Where Member States allow, they shall ensure that the sequencing of energy savings is the result of a clear, transparent and open authorisation process to all market actors, and that it aims to minimise the costs of cerfication.

On the basis of this provision, and as already stated, Law 18/2014, of 15 October, empowers the Government to establish a mechanism for attesting the achievement of an energy saving candad equivalent to compliance with the obligation to save the obligation, on the basis of the submission of CerAcified Energy Savings (CAE), resulting from the implementation of the energy efficiency measures defined in a catalogue and complying with the requirements and conditions to be laid down. Ceramics are required to be subject to a control system that includes the physical verification of a statistically significant part Ava of the measures to improve the energy efficiency of the Cerfied Aca Energy Efficiency.

In accordance with the above, and within the framework of the SNOEE, Royal Decree 36/2023, of

24 January, establishing an Aco Certified Energy Savings System and its implementing Ministerial Order, Order TED/815/2023, of 18 July, has been approved. This new system, in addition to contributing to the ambitious objective of cumulative final energy savings for the period 2021-2030, would:

- Make the way in which obligated parties comply with their final energy savings obligations more flexible, allowing part of their annual obligation to be met by implementing energy efficiency measures.
- Enable obligated parties to meet their obligations under the SNOEE at the lowest possible cost.
- Improve the efficiency of the SNOEE by making it easier to comply with the national objective of final energy savings.
- Accounting for savings generated as a result of energy efficiency actions implemented by private entities, whether or not they are subject to the SNOEE, and which, as a result of compliance with the materiality principle required by the Energy Efficiency Directive, have so far not been taken into account.
- Give final consumers the opportunity to benefit financially from the energy saving and efficiency measures put in place, not only by reducing the costs of their energy bills, but also by monetising the energy savings achieved. This will also have a stimulating effect, and it may be the final consumers themselves who demand energy efficiency actions.
- Generate non-energy benefits resulting from investments in energy efficiency in the territories of the Autonomous Communities and the cities of Ceuta and Melilla, such as boosting skilled employment, developing a business fabric linked to energy efficiency and improving production and business competitiveness linked to energy costs.
- Be a catalyst for innovation in the energy efficiency sector, consolidating an atomised sector and increasing its operational efficiency Ava.

It should therefore be noted that the objective pursued by this Royal Decree is not only to obtain annual savings in final energy consumption, but also to promote, throughout the national territory, an economy that is more resource efficient and therefore more compelling, which results, inter alia, in decarbonisation and reduction of pollutant emissions in those sectors and in those areas where the various energy efficiency actions are carried out.

2. Cumulative and annual expected savings and duration of the obligation period (s)

The amount of savings expected each year and cumulatively attributable to the obligation system and therefore for the obligated parties will be set annually **by order of the $tular of the Ministry for the Ecological Transition and the Demographic Challenge, subject to the agreement of the Government Delegated Committee for Economic Affairs**.

3. Obligated parties and their responsibilities

In the period 2021-2030, the obligated parties to whom an annual share of energy savings will be allocated will continue to be:

- Gas and electricity trading companies.

- Wholesale operators of petroleum products.
- Wholesale liquefied petroleum gas operators.

Although the DirecAva raises the possibility of obligated parties being energy traders or distributors, given that in Spain energy distributors do not carry out marketing work (unlike in other EU countries), but rather a regulated water supply from the corresponding network, it has been established that the energy traders are the obligated parties, in the case of gas and electricity.

In the case of petroleum products and liquefied petroleum gases, it has also not been considered appropriate to impose obligations on the system operator, but undertakings which place the products on the market for sale to final consumers are obliged to do so. In particular, and taking into account the atomisation in the final marketing of these products, to wholesale operators of petroleum products and liquefied petroleum gases.

The annual savings obligation or share of each of the obligated parties is calculated on the basis of the final energy sales in the national territory of each of them in year n-2, n being the year for which the obligation is established.

In order to comply with the annual energy savings obligations, the obligated parties must make an annual financial contribution to the EENF, to pay four equal payments during the year of the obligation, no later than 31 March, 30 June, 30 September and 31 December, for the amount resulting from multi Application of their annual savings obligation by the corresponding financial equivalence.

With the entry into force of the PPA scheme, part of the annual savings obligation is allowed to be saAsdated by submitting Certified Energy Savings, always respecting a minimum percentage of financial contribution to the National Energy Efficiency Fund. This minimum contribution ensures that the FNEE maintains an adequate allocation to finance both existing and approved aid programmes, as well as the costs associated with the GesAon of the fund itself.

4. Sectors addressed

The sectors covered will be all energy-consuming sectors, in accordance with the sectoral distribution indicated in section F.4.: transport, industry, residential, tertiary and agriculture and fisheries.

5. Eligible actions planned under the measure

Energy Efficiency National Fund $ca

The action programmes under the EENF to be developed during the period will be consistent with the Strategic Plan of the EENF (2024-2026) and onwards, which will be set out in annual action plans until 2030. This will be monitored in the framework of Article 73 of Law 18/2014 by the Monitoring and Control Committee of the EENF, which assigns the tasks of supervision and control of the FNEE. These include ensuring compliance with the correct application of the Fund's resources or drawing up the six-monthly report on the implementation of the Aids and the Annual Report on Acquiries.

Considerations to be taken into account in the design of eligible actions include:

- Sectoral distribution: actions can be addressed by all final energy consuming sectors:

industry, transport, buildings, services, etc., including funding for energy efficiency measures in SMEs. The EENF programmes are aimed only at the final user or customer, meaning any legal or natural person purchasing energy for their own final use, in accordance with the Directive.

- Territorial distribution: a balanced territorial distribution between regions, based on objective-based criteria, should be encouraged.
- Demographic challenge: promoting actions in municipalities with fewer than 5.000 inhabitants.
- Social requirements: supporting the implementation of priority measures among people affected by energy poverty, vulnerable customers, people in low-income households and, where applicable, people living in social housing.
- Type of energy used: the objection of reduction in consumption should concern all conventional energy sources, taking into account the limitations imposed by the recent amendment to Annex V EED and the objections of the NECP.
- Economic and energy policy: considering the financial equivalent expressed in MEUR/ktoe, which makes it possible to analyse the cost-effectiveness of the measure, differentiating between non-repayable aid programmes for loans or loans involving a return of support to the fund for new actions. The criteria governing the selection of aid programmes by the FNEE Monitoring and Control Committee combine not only a criterion of economic profitability, but also a diversified approach across all sectors of aviation and regional level.
- Form of support: it will be determined on the basis of the characteristics of the sector to which it is targeted, which may support the full range of forms of support available: non-repayable aid, loans, etc. facilitating investments.
- Consistency with the National Action Plans: the actions should be consistent with the measures of the National Energy and Climate Plan 2021-2030 (NECP) and use the experience itself, as a result of the implementation in Spain of previous action plans.

The table below sets out some programmes that could be implemented under the EENF, subject to prior approval of the annual action plans. The first column indicates whether the measure had already been implemented in the period 2014-2020 and is therefore considered to be existing or, on the contrary, can be a newly created measure:

Table F.4. Typology of action programmes under the EEFR (2021-2030)

ENERGY-EFFICIENCY NATIONAL FUND		
No of measure	SECTOR	Measure implemented during the period 2014 – 2020
TRANSPORT		
2.1	Low-emission zones and sustainable urban mobility	
	Transport plans to the workplace (PTT) (cogesMon with Autonomous Communities)	YES
	Public transport communication campaign	YES
	Renewal of the rolling stock of means of transport with more efficient ones and improvement in the gesJon	
	Fleet gesMon systems (cogesMon with Autonomous Communities)	YES
	Efficient driving courses for professional drivers (cogesMon with Autonomous Communities)	YES
INDUSTRY		
	Improvements in technology and systems for industrial processes – not energy intensive	
	In SME (cogesMon with Autonomous Communities)	YES
	In Large Enterprise (cogesMon with Autonomous Communities)	YES
2.7	Improvements in technology and systems for processes in energy-intensive industries	
	In SME (cogesMon with Autonomous Communities)	YES
	In Large Enterprise (cogesMon with Autonomous Communities)	YES
RESIDENTIAL		
2.8	Energy efficiency in existing buildings in the residential sector	
	Housing sector: Energy renovation of dwellings (CogesMón CCAA)	YES
2.9	Renewal of residential equipment	
	Communication Campaign – Equipment Mco	YES
SERVICES		
2.11	Energy efficiency in buildings in the tertiary sector	
	Buildings used in the tertiary sector: Energy renovation Tertiary buildings (CogesMón CCAA)	
	Energy efficiency in cold generating equipment and large 2.13 climate heating installations in the tertiary sector and public infrastructure	

	Furniture Renove Plan (CogesMon with Autonomous Communities)	for preservation and freezing	NEW
	Renovation of industrial cold generators (cogesMon with Autonomous Communities)	tertiary	NEW
AGRICULTURE AND FISHERIES			
2.14	Efficiency energy at holdings agricultural; irrigation communities and agricultural machinery		
	Improving savings and energy efficiency on farms (CogesMón CCAA)		
	Improvement of energy saving and efficiency in Irrigation Communities (CogesMón CCAA)		

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

CER $Energy Saving (CAE)

The PPA system, incorporated as measure 2.23 in this Plan, is a system that applies horizontally to all the sectors listed in the EED and in this Plan, **is technologically neutral** and only affects the limitations on the eligibility of energy savings that can be regulated by the Energy Efficiency Directorate itself. The CAE system therefore has the capacity **to reach $pologies of actions and beneficiaries that fall outside the scope of aid programmes financed by public funds** (FNEE, PGE and others).

The PPA system recognises two major measures:

Standardised actions, which are easily replicable and for which it has been possible to develop a technical fiche setting out the methodology for calculating the final energy savings generated by this action plan.

The set of technical sheets is included in a catalogue, under constant revision, the initial version of which was approved by Order TED/845/2023 of 18 July 2015 approving the catalogue of standardised measures for energy efficiency.

This catalogue **is structured by sector of economic activity** (agricultural sector, industrial sector, tertiary sector, residential sector, transport sector) in order to make it easier to consult and for the purposes of the statistical analysis of the measures, **although this does not prevent or limit the use of a fiche in a sector other than that indicated in the catalogue**, provided that the requirements for its application set out in the sheet are met.

Specific actions, which are those for which, due to their technical complexity and parcularities, it is not possible to draw up a technical fiche and therefore to include them in the catalogue referred to in the previous point.

F.5.2. Alterative policy measuresAvas

Section 10 of the Energy Efficiency Directive makes it possible to put in place alterative measures (those outside the SNOEE framework) that contribute to meeting the objective.

for final energy savings. During the period 2014-2020 this route was used through the development of tax measures, regulations and support programmes, among others. In the new period 2021-2030 those measures that have been most successful from the previous period will be maintained and complemented by new ones.

Table F.4 details the measures planned for the period 2021-2 030 in the NECP for the various sectors. The details requested in Annex III to the Governance Regulation are set out in detail, such as the Policy Measure Apo, a brief description of the measure and the sectors addressed.

Alterative measures can be grouped according to the executing public authority under the following headings:

- Voluntary agreements to be concluded between the State Secretariat for Energy with private companies (industry, fleet managers, residential equipment, energy service companies, etc.).
- Aid programmes co-financed with ERDF funds or financed by local authorities: aimed at the Aids that fall under the remit of the local authorities (Sustainable Urban Mobility, Buildings and Local Infrastructure) and the General State Administration (AGE) (buildings and infrastructure).
- Aid programmes with the General State Budget (PGE) and Next GeneraAon European funds under the Recovery, Transformation and Resilience Plan:
    1. Aid programmes under the PRTR Component 1 (MITECO MOVES Programmes and MITRAMS Aid Programmes).
    2. Support programmes under PRTR Component 2 (PREE, PREE 5.000, DUS 5.000)
    3. Aca AGE Energy Transition Plan
    4. MIVAU State Housing Plan.
- Legislation:
    1. Law 7/2021, of 20 May, on Climate Change and Energy Transition, which includes various amendments to existing legislation to remove barriers (Horizontal Property Law, Labour Transport Plans, etc.).
    2. Sustainable Mobility Act, as well as autonomous laws and municipal regulations related to mobility.

The following table includes a list of alterative measures, indicating whether Ado existed in the period 2014-2020 and maintained in the period 2021-2030 (idenfied as ‘EXISTENTE’) or whether they will be newly deployed in the period 2021-2030 (idenAfied as ‘NEW’).

Table F.5. Altered action programmes (2021-2030)

ALTERNATIVE MEASURES OF ACTION			
Measure	SECTOR	Type of measure	Existing measure 2014-2020
	TRANSPORT		
2.1	Low-emission zones and sustainable urban mobility		
	ERDF support programme 2021-2030 (SUD – municipalities) for the development of sustainable urban mobility plans	Help public (ERDF)	EXISTING
	Application of Law 7/2021 of 20 May on climate change and energy transition in the 145 municipalities of more than 50.000 hours (52 % of the country's population). They shall include in particular key measures such as the delimitation of central urban areas with restricted access to the most emitting and polluting vehicles. They will also boost pedestrianisation, traffic restrictions in times of increased pollution, boosting the comparison vehicle, promoting cycling, improving and promoting public transport, etc.	LegislaMva (LCCyTE)	NEW
	Development and development of a Sustainable Mobility Act, which, among other things, will require the implementation of labour transport plans for companies with more than 250 workers (large companies) and creation for these companies in the mobility coordinator.	LegislaMva (AGE) + PGE	NEW
	Municipal mobility ordinances: establishment of ZBEs, implementation of traffic restriction measures and road traffic restrictions on public roads by municipalities with > 50.000 inhabitants, in such a way as to penalise vehicles with the highest levels of consumption and pollutant emissions.	LegislaMva (Local)	NEW
2.2	Modal shift freight with higher rail presence		
2.3	Renovation of rolling stock of means of transport with more efficient ones and improvements to the gesJon		
	Voluntary agreements for the Fleet Gesmon	Voluntary agreement	EXISTING
	Amendment of the General Vehicle Regulation (RD 2822/1998): adoption of the NormaMva to bring the masses and dimensions of national trucks into line with those in our neighbouring countries. An increase in the maximum permissible mass to 44 tonnes and in height to 4.5 m will make it possible to increase the average load of such vehicles from 10 % to 2021, thereby reducing the number of vehicles per kilometre and reducing consumption for the same mass transported.	LegislaMva	NEW
	Programme to support efficient and sustainable mobility (MOVES II)	Help Public (PGE + PRTR)	EXISTING

	Rolling stock renewal programme. Ministry of Transport and Sustainable Mobility	Help public (PRTR + PGE)	EXISTING
2.4	Improving the efficiency and sustainability of ports Renovation of rolling stock of means of transport by more efficient ones and improvements in the GesJon		
2.4	Promotion of electric vehicles		
	MOVES III aid programme	Help public (PGE + PRTR)	EXISTING
	Mobility Aid Programme Ministry of Transport and Sustainable Mobility	Help public (PGE + PRTR)	EXISTING
	Inflammatory programme for individual projects in electric mobility (MOVES Singular Projects II)	Help Public (PRTR)	NEW
	Aid programme for electrification projects for light vehicle fleets (MOVES FLOTAS)	Help Public (PRTR)	NEW
	Legislative measures (as defined in Measure 2.5)	LegislaMva (AGE)	NEW
	Fiscal measures (as defined in Measure 2.5)	(Age + Autonomous Community) + Local)	NEW
	INDUSTRY		
2.6	Improvements in non-energy intensive industry process technology and systems		
	Voluntary agreements industry	Voluntary agreement	EXISTING
2.7	Improvements in technology and systems for processes in energy-intensive industries		
	Voluntary agreements industry	Voluntary agreement	EXISTING
	RESIDENTIAL		

2.8 energy efficiency in existing buildings in the residential sector

	Support programme Housing Plan – Ministry of Public Works (current MIVAU)	Aid (PGE) public	EXISTING
	Energy renovation programme for existing buildings in municipalities of the Demographic Challenge (PREE 5000)	Public Aid (PRTR)	NEW
2.9	Renewal of residential equipment		
	SERVICES		
2.11	Energy efficiency in buildings in the tertiary sector		
2.13	Energy efficiency in cold generating equipment and large climate heating installations in the tertiary sector and public infrastructure		
	Aid programme for the renovation of buildings and infrastructure ERDF 2021-2030 – AGE	Help public (ERDF + PGE)	EXISTING
	Draft Law on Climate Change and Energy Transition: Extension of Link 5 of Directive 2012/27/EU to all public administrations (renovation of 3 % of the surface area of buildings in the Autonomous Communities and municipalities)	LegislaMva (LCCyTE)	NEW
	Aid programme for the renovation of buildings and infrastructure ERDF – municipalities	Support public (ERDF)	EXISTING
	Support programme for investments in unique local clean energy projects in Demographic Challenge municipalities (DUS 5000)	Public Aid (PRTR)	NEW
	Plan for the Energy Transition in the AGE	Public Aid (PRTR)	NEW

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

F.5.3. Fiscal measures

Section 10 of the Aca Energy Efficiency Directive allows the objective of savings to be met by means of alterative measures. These include taxation, which is developed in a separate section, as indicated in Annex III to the Governance Regulation. This includes a brief description of the tax measure and the sectors addressed, as well as an indication of whether it was an existing measure in the period 2014-2020.

Table F.6. Fiscal measures foreseen in the NECP for the period 2021-2030

ALTERNATIVE MEASURES (TAXATION)		
Measure	**SECTOR**	**Measure existing period 2014-2020**
	TRANSPORT	
2.3	**Renovation of rolling stock of means of transport and efficiency in the GesJon**	
	Green tax reform led by the Ministry of Finance: possible new measures associated with the sector in order, inter alia, to comply with the energy saving and efficiency objective, as well as decarbonisation, following the principle of gradual design and implementation, taking into account the international context and the economic situation at any given time.	NEW
2.5	**Promotion of electric vehicles**	
	The Ministry of Finance, through measures to contribute to and accelerate the penetration of the VE in ES. ● Law 31/2022, of 23 December 2015 on the General Budget of the Status for 2023. ● Royal Decree-Law adopted by the Council of Ministers on the 27th day June 2023	NEW
	RESIDENTIAL	
2.8	**Energy efficiency in existing buildings in the residential sector**	
	The Ministry of Finance and the Civil Service, improving the taxation of energy efficiency improvements in buildings, in order to internalise the potential externalities it entails.	EXISTING
	Law 10/2022, of 14 June, on urgent measures to boost building renovation action in the context of the Recovery, Transformation and Resilience Plan	EXISTING
	SERVICES	
2.11	**Energy efficiency in buildings in the tertiary sector**	
	Depending on the results of the incenMvos for energy renovation in the residential sector, the Ministry of Finance and the Civil Service will analyse the possibilities for improving taxation in the actions in buildings relating to this sector.	NEW

Source: Ministry of Ecological Transition and the Demographic Challenge, 2024

F.5.4. Principles and methodology for calculating energy savings

Annex V to Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) sets out the common methods and principles for calculating the impact of energy efficiency obligation schemes or other policy measures under Articles 8, 9 and 10 and Article 30 (14). In other words, it sets out the methodology and principles for the calculation of energy savings from the SNOEE and the altered measures.

For their part, Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of the energy savings obligations under the Energy Efficiency Directive and Commission Recommendation (EU) 2024/1590 of 28 May 2024 on the transposition of Articles 8, 9 and 10 on provisions on energy savings obligations, of Directive (EU) 2023/1791 of the European Parliament and of the Council on energy efficiency express the view of the European Commission on how to understand and apply arcades 8, 9, 10 and 30.14 and Annex V.

At national level, and in order to ensure compliance with Annex V to the Energy Efficiency Directive, the Resolution of 22 December 2022 of the Secretariat of State for Energy approving the principles and methodology to be taken into account for the accounting of final energy savings, in accordance with the provisions of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, was published216.

As basic concepts of the methodology and principles to be applied in accounting for energy savings, the following should be observed:

1. Savings start to occur at the time when the implementation of the energy efficiency action ends and is therefore the point in time at which they should start to count.
2. The savings must be counted throughout the lifetime of the energy efficiency action (declared or based on statistical data), with a maximum of 31 December 2030 to ensure that the obligation periods remain impervious.
3. Where applicable, the decrease in energy savings over the lifetime of each measure should be taken into account (rate of decrease, which may exist Ar or not and may vary depending on the measure or policy option).
4. When accounting for savings generated by a given action, account must be taken of the existence of applicable regulations or of normaAva relaAva to eco-design.

   In such cases, the baseline from which savings should be calculated is the minimum required in those standards or regulations.
5. Actions arising from measures/calls from the previous obligation period (2014-2020) may be accepted, provided that they result in new actions within the current 2021-2030 obligation period (e.g. call for applications dated 2020 but actions implemented in 2021 or later).
6. Double counting of energy savings is expressly prohibited. This point is of particular relevance since there may be an overlap of polyAcas as a result of the parallel use of the SNOEE and of alterative measures, or an overlap between disAnta administrations.

216 Resolution of 22 December 2022 of the State Secretariat for Energy approving the principles and methodology to be taken into account for the accounting of final energy savings, in accordance with the provisions of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency.

ANNEX G. PARTICIPATORY AND COMMUNICATION PROCESS

In accordance with Regulation (EU) 2018/1999 of 11 December on Governance for the Energy Union and Climate Action, EU Member States shall submit integrated national energy and climate plans (NECPs) during their preparation to a public information process. As was the case during the preparation of the initial NECP, this process was carried out during this update of the NECP.

The preparation of the NECP has been enriched by an extensive process of parcipation and consultation, including consultation prior to drafting the draft and working days, as well as subsequent public consultation of the draft, complemented by the Acipavo process as part of the Strategic Environmental Assessment procedure. This is in addition to the processes of listening and anticipation: Renewable energy and land as detailed below.

When conducting public consultations, and in line with the Aarhus Convention, Member States should endeavour to ensure a fair Ava parcipation, that the public is informed by means of public notices or other appropriate means, such as electronic means of communication, that the public can access all perent documents, and that practical arrangements are put in place. Member States' integrated national energy and climate plans, as well as their long-term strategies, should be able to debateArse in the framework of that dialogue.

To date, as part of the overall public consultation process for updating the NECP, the following parcipation processes have taken place:

- First, a preliminary public consultation process took place in August and **September 2022**, so that Spanish society as a whole is informed, parAcipe and makes proposals on the NECP. Over 2.000 contributions were received during the consultation from more than 120 stakeholders, most of them associations and companies, but also from the public and academic sector, among others.

- Subsequently, between April and May 2023, 'Working Days for the Update of the National Energy and Climate Plan' were held around sessions developed as a forum for discussion and dialogue, in order to gather the different contributions and views of various actors representing musicians, sectors and areas of the economy, related to the NECP, as well as of paradcipant actors in the prior public consultation. At these days, a large number of organisations representing the sectors concerned in the energy and climate policy areas, including representatives of civil society such as non-governmental, trade union, environmental, rural and consumer organisations; business organisations in the waste sector, etc.; monitoring and market operation organisations; and representatives of the invesment and development sector.

- The **public consultation process on the Draft Update of the Plan took place from 28 June to 4 September** 2023, in order to obtain input, comments and proposals from all the stakeholders prior to the drafting of the definiAvo document. During this consultation process, more than 380 actors were received and more than 10.000 contributions were received.

- More recently, the processes of listening and stopping took place in March 2024: Renewable Energy and Territory organised by MITECO217. These days have been put forward as a forum for listening, dialogue and anticipation, which allowed us to learn about the current situation, exchange experiences, update technical knowledge, and to identify instruments and areas of action, as it is necessary to take into account both the opportunities and benefits, as well as the difficulties and challenges that the deployment of renewables entails in the territory.

- On 27 June 2024, the draft update of the NECP was submitted for consideration by the Committee for the Coordination of Climate Change Policies, as a body for coordination and cooperation between the General State Administration and the Autonomous Communities, and the National Climate Council, as the economic

217 Listening and climbing days: renewable energy and territory

forum for parcipation of all public administrations, as well as organisations and bodies representing social and environmental interests in the preparation and monitoring of the National Climate Change Policies promoted by the State.

- First, from 12 June to 12 July, the consultation phase of the strategic environmental study of the NECP (EsAE) remained open, opening a new parcipation window, in this case with regard to the environmental aspects of the NECP.

Prior public consultation for the update of the integrated national energy and climate plan

The prior public consultation process aims to enable Spanish society as a whole to make proposals so that they can be taken into account when drawing up the draft plan.

In the process of drawing up this draft of the first update of the NECP**218, a preliminary public consultation** was carried out between 2 August and 15 September 2022. It called on the Parentors to make the appropriate contributions on the updating of the policies and measures contained in the PNIEC 2021-2030 currently in force. To this end, a summary table with the measures grouped by size, where the contributions could be made, was made available to the Parcipants.

A total of 2.071 observations were received from 128 members of staff. Most of the actors involved in the public consultation are: associations (64), followed by companies (40), paraquilles (10), public administrations (9) and academics (1). With regard to the sectoral scope of the Parents, 44 % are in the energy sector, 15 % in the industrial sector, 9 % in both the environment and transport sector and with percentages less than 2 % going into Aggregation, Storage, BiocombusAbles and Construction (see Figure G.1).

Figure G.1. Classification of agents by typology and scope in prior public consultation

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In relation to the comments received by dimension, the dimension of Decarbonisation corresponds to 1.073, Energy Efficiency Aca 459, Energy Security Aca 129, Internal Energy Market 220, and InvesAgation to Innovation and Competence 117. Furthermore, as regards the interlinkages between the NECP and other plans (in particular with the NAPCP), there are 32 comments and 41 marked as others or as cross-cutting Apo. (see Figure G.2).

Figure G.2. Ranking of inputs according to dimensions in the prior public consultation

218 Public Parcipation – MITECO

Working days for the update of the integrated national energy and climate plan

During April and May 2023, the working days for updating the NECP were held at the premises of the Ministry for the Ecological Transition and the Demographic Challenge. A large number of organisations representing the sectors affected and interested in the Energy and Climate Policies, including representatives of civil society, such as non-governmental, trade union, environmental, rural and consumer organisations; business associations from different sectors such as production, distribution and marketing of electricity, renewable fuels, photovoltaic, wind, thermosolar, waste sector, etc.; monitoring and market operation organisations; representatives of industry, the agricultural sector, the construction sector, energy efficiency, the transport sector and representatives of the invesand development industry, among others.

The sessions were organised into a total of 14 working tables made up of representatives of the various sectors mentioned above, and also included the public who was able to express their views, contributing to the debate, and also to participate in rounds of questions and answers, thus creating a forum for discussion between the various actors involved in the NECP. Each of these tables was moderated and energised by a representative of the various departments of the public administration involved in shaping the NECP.

In more detail, the first working days for the update of the integrated national energy plan were held on 17 April 2023 at the headquarters of the State Secretariat for Energy of the Ministry for the Ecological Transition and the Demographic Challenge.

On 18 and 19 May 2023, the second working days for the update of the integrated national energy plan were held at the headquarters of the State Secretariat for Energy of the Ministry for the Ecological Transition and the Demographic Challenge.

Specifically, on 18 May, it was entirely dedicated to diffuse sectors by holding the following round tables:

- Bureau 1: Agriculture and sinks

  Speakers: Unión de Pequeños Agricultores (UPA), CooperaAvas Alimentarias, Spanish Federation of Food and Drinking Industries (FIAB), Spanish Association of Living Soil Conservation Agriculture.

  Moderator: Ministry for Agriculture, Fisheries and Food.

- Bureau 2: Residential

  Speakers: Madrid Capital World (MWCC), Commissions Obreras (CCOO), Tecma Red Group, Climate Equipment Manufacturer Association (afec).

  Moderator: InsAtuto de Diversificación y Aco Aco (IDAE).

- Bureau 3: Transport

Speakers: Asociación Española de Operadores de Productos Petrolíferos (AOP), Transport de Productos Petrolíferos (TA), Spanish Association of Automobile and Camion Manufacturers (ANFAC), Association of Spanish Navieros (ANAVE), Asociación de Líneas Aéreas (ALA), RENFE.

Moderator: MITRAMS.

- Bureau 4: Waste and the circular economy

  Speakers: Spanish Composting Network, Asociación Técnica para la GesAón de Residuos, Aseo Urbano y Medio Ambiente ATEGRUS, Spanish Federation of Municipalities and Provinces (FEMP), Federación Española de Bancos de Alimentos, Asociación Española de Abastecimientos de Abastecimientos de Aguas y Saniteamiento (AEAS).

  Moderator: Subdirectorate-General for the Circular Economy of the Ministry of Ecological Transition and the Demographic Challenge.

Table G.1. Work Days Programme for the Update of the National Integrated Plan for Energy and Climate

WORKING DAYS FOR UPDATING THE INTEGRATED NATIONAL PLAN OF ENERGY AND CLIMATE.
27 April 2023 **Session 1: NECP Review and Target Definition Process**
Welcome and opening. Revision process of the NECP. Bureau 1: Revision of the objectives of the NECP in the context of the Fit for 55package. Bureau 2: Dimension Decarbonisation. Bureau 3: Energy Efficiency Dimension. Bureau 4: Internal Market dimension. Bureau 5: Dimension Energy Security Bureau 6: R & I & c dimension Bureau 7: Cross-cutting aspects: socio-economic impact, territory and adaptation to climate change Closure and conclusions.
18 May 2023 **Session 2: Sectors Difuses**
Welcome and opening. Revision of the NECP. Diffuse sectors Bureau 1: Agriculture Bureau 2: Residential Bureau 3: Transport Bureau 4: Waste and circular economy. Closure and conclusions.
19 May 2023 **Session 3: The future of the energy system**
Welcome and opening. Bureau 1: Towards a decarbonised energy system Bureau 2: First, Energy Efficiency Bureau 3: The Future of the Application Closure and conclusions

Public consultation of the draft update of the plan

After the draft for the update of the NECP was sent to the Commission on 28 June 2023, the document was

submitted for public consultation between 28 June and 4 September 2023. In summary, it is worth noting that:

- More than **10.000 contributions** were received out of a total **of $382**. Of the contributions, approximately 3.350 are identical as unique (companies and associations often reproduce the same claims)
- By Apo de Parcipante, the largest share comes from **citizens at $cular level (39 %), followed by civil society organisations** (NGOs, citizens' platforms, etc., with 24 %), business associations (18 %) and businesses (14 %).
- By sector, the largest share comes **from the energy sector, followed by industry, services and transport**.
- The dimensions with the highest concentration of claims are Decarbonisation and the Internal Market, the first being the most commented on.

The breakdown by Apo de Parcipante and sector is set out in the tables and graphs to the following headings:

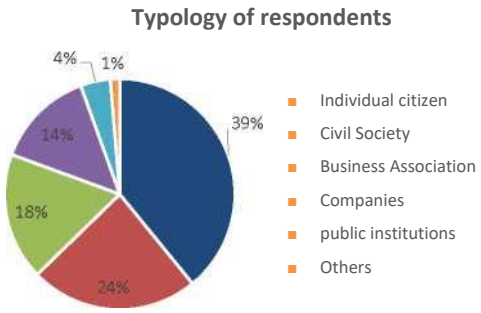
(a) Classification by Apo de Parcipante:

Table G.2. Type of participants in the public consultation

TYPOLOGY OF RESPONDENTS	No of Parucipants
Individual citizen	149
Civil Society (NGOs, citizens' platforms, trade unions, etc.)	90
Business Association	67
Companies	54
Public Instution	17
Others	5
Overall total	**382**

Compared with the previous public consultation on the update of the NECP, there was a significant increase in parcipation at the general level, from 128 to 382 parentatives, specifically from civil society associations (from 15 % to 24 %) and from citizens to individual htulo (from 8 % to 39 %). An analysis of the contributions revealed that a great deal of the aforementioned actors sent comments.

Figure G.3. Classification of actors according to typology and scope in the public consultation of the draft

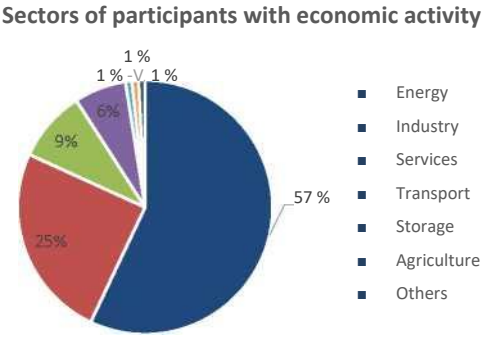


(b) Classification by sector, taking into account only the parcipants with economic activities, i.e. 67 business associations and 54 companies:

Table G.3. Sectors associated with participants in the public consultation

Sectors OF THE PARTICIPANTS WITH ECONOMIC ACTIVITY (business associations and companies)	Torque No $cipants
Energy	69
Industry	30
Services	11
Transport	8
Storage	1
Agriculture	1
Others	1
Overall total	**121**

Figure G.4. Classification of operators by sector of activity in the draft public consultation



As regards the details of the most recurrent content in the arguments, the following should be noted:

- **Measure 1.5. Energy storage $co.** Adequate payment for storage or greater visibility of distribution by technology is requested.
- **Measure 1.28. Simplification of procedures administers $vos**. Greater legal certainty is called for for investment promotion, a stable regulatory framework, acceleration of procedures.
- **Measure 1.3. Development of new renewable electricity generation facilities. An increase in electrification and demand is**requested. Further reduction of emissions and reduction of dependence on natural gas.
- **Measure 1.10. Decarbonisation of the industrial sector. Technological neutrality, aid and financing, and promotion of CCUS**are required. Increased presence of biogas/biomethane.
- **Measure 2.5. Boosting the electric vehicle** Stepping up the deployment of the electric vehicle, more subsidies and tax credits, plus charging points.
- **Other:**
    - More impulse to biocombusAbles
    - More transparency in monitoring the achievement of policy areas and measures
    - Improve public parcipation, in particular detailed information on modelling
    - Need for more sign of investment in the value chain, networks

A significant part of the contributions received goes beyond the scope of the Plan by referring to very specific areas such as:

- Specific proposals for a new electricity market design and capacity markets
- Network deployment measures for recharging points
- Specific aspects in the framework of the tax reform
- Promotion of very specific technological solutions through sectoral objections (biogas, biomethane, biocombusAbles, cogeneration)

Consultation of collegiate bodies

The draft update of the integrated National Energy and Climate Plan 2023-2030 was considered by the Committee for the Coordination of Climate Change Policies, as a body for coordination and cooperation between the General State Administration and the Autonomous Communities, and by the National Climate Council, as the economic forum for the promotion of all public administrations, as well as organisations and bodies representing social and environmental interests in the preparation and monitoring of the relevant State climate change policies, meetings held on 27 June 2024. The comments made by the members of the National Climate Council on the draft update of the NECP were appreciated and considered in order to assess its potential for the final version to be submitted to the European Commission.

Strategic environmental assessment of the NECP

The updating of the NECP is subject to the procedure laid down in Chapter I of Law 21/2013 of 9 December 2003 on environmental assessment. This Law establishes the need to carry out a Strategic Environmental Assessment (SEA), understood as a prevention instrument that enables environmental aspects to be integrated into the decision-making of public plans and programmes. To this end, a strategic environmental study has been prepared and consultations have taken place, taking into account one of the main objections of this Law – the **$cipation public** – and the results of these consultations have been taken into account in the drafting of the Law.

In accordance with the aforementioned Law, the environmental body proceeded with the procedure and placed the draft update of the NECP and the initial strategic document on the draft update of the NECP and the initial strategic document and consulted the public on the MITECO website. Once the responses to the consultations have been received, the environmental body has drawn up the document on the scope of the strategic environmental study, which is also published on the MITECO website.

On 12 February 2024, the regular strategic environmental assessment procedure was formally initiated before the Directorate-General for Environmental Quality and Assessment. On 18 April 2024, the scope document containing the guidelines, comments and contributions from the administrations and persons consulted for the preparation of the Strategic Environmental Study of the PNIEC 2023-2030 was received.

The Strategic Environmental Study of the update of the NECP for the period 2023-2030 focuses mainly **on the changes that this update entails in the planning framework**. Among the most significant potential environmental effects arising from the update of the NECP, it should be noted that the main changes compared to the previous NECP result directly from the increased climate ambition to protect the environment and the consequent increase in much of the objections. This results, among other things, in greater penetration of renewable technologies, increased energy efficiency for industry, mobility or buildings and electrification of energy end uses. The deployment of renewables is necessary to achieve the objectives of reducing greenhouse gases (GHG) and targeting climate change. In addition, renewables make it possible to strengthen Spain's strategic autonomy, consolidating the existing value chain and positioning our country as a technology and knowledge reference.

Specifically, Chapter 9 of the Strategic Environmental Study (SEA) for the update of the 2023-2030 NECP details the environmental measures and recommendations envisaged to improve the environmental integration of the NECP at the strategic level.

In compliance with Articles 21 and 22 of Law 21/2013 on environmental assessment, the Strategic Environmental Study was published on 11 June 2024 on the website of the Ministry for the Ecological Transition and the Demographic Challenge, opening the public information period until 12 July 2024. This was done under the Agreement of the Subdirectorate-General for Environmental Assessment, which granted the urgent procedure. In parallel, targeted consultations were carried out with the public administrations concerned and the persons concerned.

The**subsequent Strategic Environmental Declaration states that the update of the 2023-2030 NECP**, incorporating the environmental measures and recommendations set out in the ESAE, together with the environmental determinations included therein, **will not have an impact on the environment.**

ANNEX H. INTERACTIONS WITH OTHER PLANS AND PROGRAMMES

The NECP defines the objectives of reducing greenhouse gas emissions, penetration of renewable energy and energy efficiency. The relevance of the National Plan and its intense environmental and social implications mean that there are many planning instruments with which it interacts.

In addition, we present an analysis of the links between the NECP and the main planning instruments (strategies, plans and programmes), both sectoral and territorial, which have been taken into account in the strategic environmental study and which are closely linked to the environmental objectives of the National Plan. The planning instruments have been organised by the various environmental aspects:

- Climate change
- Air Quality
- Geodiversity and soils
- Waters
- Biodiversity (fauna, vegetation, flora and habitats), protected natural areas and Natura 2000
- Coastal and marine environment
- Landscape and cultural heritage Soil uses, spatial planning and socio-economic development
- Energy and industry
- Transport and mobility
- Housing
- Circular economy: consumption of resources and waste water
- Population, public health and material goods
- Investing Aging and Innovation

It should be pointed out that, although some of the planning instruments are somewhat anxious or are close to the end of their period of validity, they have been included in the analysis as they set out the fundamental background and have been marking the environmental protection objections in the various sectors.

1. Climate change

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
National Plan for Adaptation to Climate Change 2021-2030	The second National Plan for Adaptation to Climá/co Change (PNACC) 2021-2030, approved in September/December 2020, provides the basic planning instrument to deal with the effects of climate change in Spain. Promotes coordinated and coherent action against risks and threats posed by climate change in the different areas of society, from a Perpec/va transverse (from dis/nth fields), mul/side (by dis/nth actors) and mul/level (from dis/NTAS territorial scales). It defines glue (s), criteria, areas of work and lines of action to foster adaptation and resilience to climate change. The Work Programmes of the PNACC 2021-2030 are: basic instruments for planning operate/go and programming for adaptation. The first Work Programme, covering the period 2021-2025, was adopted on 21 February 2022.	The NECP is a planning tool. responds to Spain's commitments facing the challenge of clima/co change. Your obje/vos measures are in line with the NAPCP. The NAPCP contributes to the NECP waves and its five dimensions through the concrete measures integrated in its Work Programmes (WP) and the NECP contributes to the NECP through some of its measures, establishing a synergistic flow in both of its measures. directions reinforcing both plans and ensuring a "to test" transition of clima/co change.
Spanish Strategy for Change Climat9co and Energy Clean (EECCYEL) 20072012-2020	The Spanish Strategy for Climá/co Change and Clean Energy (EECCYEL) aims to meet Spain's commitments on climate change and to boost clean energy, thereby enhancing social well-being, economic growth and environmental protection.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. It is in line with EECCYEL. The NECP strengthens the momentum for energy clean, as the envisaged measures will lose/will reach 48 % renewables on energy end-use and 81 % renewable energy in electricity generation by 2030. In addition, it will drive a significant increase in energy efficiency, thereby achieving Spain's GHG emissions neutrality in 2050. On the other hand, the NECP will contribute to social well-being, as it has benefits for health (reduced number of premature deaths due to air pollution) and the energy/energy economy of the population.

2. Air Quality

Planning instrument	Objects or requirements of the instrument planning with which the NECP can interact	Significant interactions between the PNIEC and the objections to the planning instrument
Second National Emission Reduction Programme	The NERP/aims to promote the measures necessary to approximate compliance with the National Emission Ceilings established by Direc/va 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants: - Sulphur dioxide SO2: 746 kt - Nitrogen oxides NOx: 847 kt - Volt/non-methane organic compounds NMVOC: 662 kt - Ammonia NH_3: 353 kt	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. It is in line with the NRRP. One of the relevant results presented in the NECP is the penetration of renewable energies and the gradual decrease in electricity production at par/r of Combus/bles (decarbonisation dimension), which leads to a reduction of pollutant emissions to the air. In addition, the NECP (energy efficiency dimension/ca) contributes to the reduction of emissions in the non-energy diffuse sectors (agriculture, livestock, forest sinks, waste ges/on, fluorinated gases) and energy/cos diffuuses (residential, commercial and ins/tutional, transport and industry not subject to emission allowances).
Update of the National Air Pollution Control Programme (NAPCP)	The first National Control Programme for the Air pollution defined obje/vos and strategic actions at par/r of 2020. This update of the 2023-2030 Programme includes the analysis that started in 2019 and sets out a series of sectoral and cross-cutting measures, in line not only with national pollen/air quality, but also with polí/cas energé/cas y climá/cas defined in the update of the integrated National Energy and Climate Plan 2023-2030. The new national commitments for the reduction of anthropogenic emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x), organic compounds shall be volved/non-methane (NMVOC), ammonia (NH_3) and fine parcules ($PM_{2.5}$) for the reference year 2005:	The NECP is a planning instrument that responds to Spain's commitments to the challenge of climate change. The NAPCP sets out cross-cutting and sectoral measures in line with the polí/cas climá/cas y energé/cas defined in the draft update of the integrated National Energy and Climate Plan 2023-2030. The combination of measures in the updates of the NECP and the NAPCP will/will reduce the number of premature deaths linked to air pollution to 2030. In addition, the PNCAA (energy efficiency dimension/ca) contributes to the reduction of emissions in the non-energy/non-energy diffuse sectors (agriculture, livestock, forest sinks, waste ges/on, fluorinated gases) and energy/cos diffuuses (residential, commercial and ins/tutional, transport and industry not subject to emission allowances).

	SO2	*NOX*	*NMVOC*	*NH3*	*PM2.5*
2020 2029	67 %	41 %	22 %	3 %	15 %
From 2030	88 %	62 %	39 %	16 %	50 %

3 Geodiversity and soils

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the PNIEC with the Objectives of the instrument of planning
National plan of priority actions on hydro-forestry restoration, erosion control and protection against deser9fication (PNAP).	It is the general framework for the development of work to restore, conserve and improve protective plant cover. They include erosion control, improved water regime and flow regulation, and maintaining and improving the protective function of forests on soil and water resources, among others. The PNIEC is in line with the NPAP as it includes hydrological and forest restoration in areas with a high risk of erosion among its measures. It also contributes to the fight against climate change (by	increasing carbon sinks), avoiding, in the long term, an increase in de-rating. In this case, Measure 1.35 is highlighted. Forest sinks, which includes actions such as the creation of wooded woodland, forestry work and controlled grazing for forest fire prevention, as well as hydrological/forest restoration in areas at high risk of erosion, among others.
Action Programme National against the Deer9fication (PAND)	The drafting and development of the National Programme of Action against Derogation (PAND) cons/has the main obligation assumed by our country as a signatory to the United Nations Convention to Combat Deseration/Determination (UNCCD). It provides for the development of preventive/even-handed actions, rehabilitation, inventions, education and public awareness in the fight against depopulation/development. It seeks to contribute to the sustainable development of the affected areas of the national territory and, in parallel, to prevent the degradation of wars and the recovery of wars/wars.	The measures foreseen in the NECP are in line with the PAND. Similarly, the PAND measures contribute to increasing CO2 sinks$_{and}$ benefit the fight against climate change. In this case, Measure 1.35 is highlighted. Forest sinks, which includes actions such as the creation of wooded woodland, forestry work and controlled grazing for forest fire prevention and hydrological/forest restoration in areas at high risk of erosion, among others.
The National Strategy to Combat Deseration9fication	The obje (s) and principles document analyses the pollen (s) that have the greatest impact/have on desenching/development, draws up a diagnosis of the situation in Spain (causes, impacts, main scenarios for desenching/cutting and SWOT analysis) and proposes measures and actions to improve the governance of the fight against desertification and to encourage a shift of wars to prevent their degradation. The measures foreseen in the NECP are in line with the ENLD. Similarly, the ENLD measures contribute to increasing CO_2 sinks and benefit the fight against climate change. In this case, Measure 1.35 is highlighted. Forest sinks, which includes actions such as the creation of wooded woodland, forestry work and controlled grazing for forest fire prevention and	hydrological/forest restoration in areas at high risk of erosion, among others.

4 Waters

Instrument for planning	Objectives or requirements of the instrument of planning with which the objectors of the instrument of the NECP	significant interactions in the PNIEC with planning
Hydrological plan National (PHN)	The National Hydrological Plan in force was approved by Law 10/2001 of 5 July, the National Hydrological Plan, and subsequently amended by Law 53/2002 of 30 December, Law 62/2003 of 30 December, Royal Decree-Law 2/2004 of 18 June, and Law 11/2005 of 22 June. It is the instrument that integrates the relevant demarcation plans in order to achieve a harmonious and coordinated use of water resources. The PHN with/implements the coordination measures and the solution to possible discrepancies between RBDs/NTAS, uses and uses for the supply of populations or irrigation, and the forecast and conditions for transfers of water resources. In addition, the delimitation and characterisation of groundwater bodies compel/de between two or more RBDs, including the allocation of resources to each of them.	No relevant interactions with the PHN are foreseen in the development of the NECP measures. In any case, the location of future hydroelectric uses must comply with the waffles/beds of the PHN.

Instrument for planning	Objectives or requirements of the instrument of significant interactions in the PNIEC with planning with which the objectors of the instrument of the NECP	planning
River basin management plan. Third WFD cycle (2022-2027)	River basin management plans are drawn up to comply with Royal Decree 907/2007 of 6 July 2015 approving the Hydrological Planning Regulation. The general waves of the river basin management plans are to achieve good status and adequate protection of public water resources (DPH) and waters, the extent/sfaction of water demands, the balance and harmonisation of regional and sectoral development, increasing the availability of the resource, protecting its quality, economising its use and rationalising its uses in harmony with the environment and other natural resources. The transposition into Spanish law of Direc/va 2000/60/EC of 23 October establishing a framework for Community action in the field of water pollen/ca (WFD) has meant that, in addition to the aforementioned waffles/beds, good status in the water bodies in the river basin district (understood as the achievement of environmental glue (s) in those bodies) is covered by planning and introducing the principle of restoration.	ecosystems - Measure 1.2 Development of renewable energies Compound with the territory and rural development - Measure 1.3. Development of new electricity-generating installations using renewable energy - Measure 1.4. Development of innovative renewable energy installations - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.9. Development of new hydroelectric storage capacity - Measure 1.17. Plan for the repowering and repowering of existing renewable power generation projects - Measure 1.35. Forest sinks On the other hand, climate change/co/direct effects on water resources, so the measures to be developed under the NECP for my/her impact of the climate change will be in line with the buffer (s) of the management plans.
Ges9on Inundation Risk Plans (PGRI)	The plans for flood risk are drawn up in order to comply with Royal Decree 903/2010 of 9 July 2007 on flood risk assessment. The general approach to the plans is to ensure that the current flood risk is not increased and, as far as possible, reduced by coordinated action by public administrations and society. To this end, there are programmes of measures, which must take into account all aspects of the risk gap, focusing on prevention, protection and preparedness, including flood forecasting and early warning systems, and taking into account the characteristics of the river basin or sub-basin concerned, and the possible effects of climate change. The hydraulic uses to be developed (although the NECP foresees a very limited increase) must be fully Compa/bles and respect the River Basin Management Plans. In any event, the protection of the HDP and the status of water bodies must be taken into account. The measures of the NECP, including the deployment of hydroelectric and hydraulic pumping facilities, must be aligned with the wings/ropes of these plans, in this case in pair/cular terms in terms of potential alterations to the water bodies (hydromorphology and quality). Among the measures in the NECP, which must be taken into account in its development, the River Basin Management Plans must take into account: - Measure 1.1 Development of renewable energies Committed to biodiversity and protection of	River restoration measures and measures for hydrological/agroforestry restoration of river basins must be considered in the Gges/Flood Risk Plans. The NECP provides an opportunity for the development of these measures: - Measure 1.9 Development of new hydroelectric storage capacity - Measure 1.35. Forest sinks On the other hand, the measures proposed in the NECP will help me the effects of climate change in the long term and are therefore measures to support flood risk plans.

Instrument for planning	Objectives or requirements of the instrument of significant interactions in the PNIEC with planning with which the objectors of the instrument of	
	the NECP	planning
Special plans for Drought (PES)	The plans in force (approved in 2018) are under review to be updated in line with the third cycle hydrological planning. PES dis/None situations of drought (as a natural phenomenon independent of human water or water), scarcity situations, related to temporary problems in meeting existing demands for the different socio-economic uses of water. The general collection/roof of PES is to overcome drought episodes with the least possible impact on ecosystems and water uses, and is concretised through the following specific waffles/keys: - Ensure/ensure the availability of water required to ensure the health and life of the population, minimising the impact of drought periods on urban supply. - Minimise the Nega/Live effects of drought on the status of water bodies. Minimise Nega/vos impacts on AAs/economic vities.	hydrogen Although some measures in the NECP may involve a demand for water, mainly for the production of renewable hydrogen, it is important to note that the change of model towards decarbonisation will mean an ex/ntion of water demand for thermal power plants. It is also important to highlight that your mentation of the current consumption of grey hydrogen by renewable hydrogen leads to net water savings. On the other hand, hydraulic storage systems do not lead to higher net water consumption (beyond restocking), but rather their displacement between reservoirs at dis/NTAS heights. On the other hand, the measures proposed in the NECP will help me the effects of climate change in the long term and are therefore measures to support special drought plans.
Environmental Action Plan for Adaptation to Climate Change 9co in Spain (PIMA- Adapta-AGUA)	This plan/aims to improve knowledge and monitoring of the impacts of global change and climate change in the field of water resources, minimising their risks and increasing the system's resilience to climate change. - Gge/on measures and adaptation of river nature reserves (RNF). - Adaptation to extreme events. - Assessment of the impact of climate change on water resources and development of adaptation strategies. - Development of projects to adapt to climate change in the public water domain. In the development of the measures provided for in the NECP, which are intended to constitute an additional demand for water resources, it will be essential to take into account the specifications and collection (s) of the PES. Among the measures that may have a link with water resources are: - Measure 1.9. Development of new hydroelectric storage capacity - Measure 1.16. Development of renewable	In the territorial development of the NECP, there is no provision for interference with the River Natural Reserves, in which the Plan PIMA-Adapta- AGUA provides for Gases and Adaptation measures. On the other hand, the measures proposed in the NECP will help me the effects of climate change in the long term and are therefore measures to support flood risk plans.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
National strategy for the restoration of rivers (2022-2030)	The overall focus of the Strategy is to boost the current river Gases to achieve good ecological status in accordance with the provisions of the Water Framework Direc/va, integrating the river ecosystems' gifts into the use pollen and ges/ón of the territory, among others.	The development of the NECP measures, such as hydroelectric or hydraulic pumping installations, must take into account the approach of the National Strategy for the Conservation of Rivers with a view to their possible impact on river systems and thus my/their potential impact on the achievement of the WFD waffles/beds. The measures of the NECP, which in its development must take into account the Strategy, include: - Measure 1.3. Development of new electricity-generating installations using renewable energy - Measure 1.4. Development of innovative renewable energy installations - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.9. Development of new hydroelectric storage capacity - Measure 1.17. Plan for the repowering and repowering of existing renewable power generation projects
Strategic Wetlands Plan 2030	It responds to Spain's obligations as a member of the Ramsar Wetlands Convention "Ramsar Strategic Plan 2016-2024". The Plan is the framework instrument that integrates all sectoral pollen and aims to coordinate and control actions in a Compa/ble form with the conservation of these ecosystems. It has as its object the conservation and rational use, restoration and necessary integration of the conservation of these ecosystems into the sectoral pollen (s) that affect them.	Wetlands are ecosystems relevant to my/navigating climate/co change as a source of CO_2 absorption. The NECP does not provide for actions to be carried out in wetlands or likely to affect them. In any case, account must be taken of the conservation of these habitats, as well as of the aqua/ca birds associated with them. The NECP will promote additional measures for the conservation and promotion of native biodiversity and aquatic ecosystems, linked to the 2030 Strategic Wetlands Plan.

5 Biodiversity (fauna, vegetation, flora and habitats of Community interest), Protected Natural Areas and Natura 2000 network

Instrument for and the planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP objections to the planning instrument
State Strategic Plan for Natural Heritage and Biodiversity as at 2030	The Strategic Plan for Natural Heritage and Biodiversity at 2030 cons/has the fundamental development element of Law 42/2007 on Natural Heritage and Biodiversity. Their main focus is to halt biodiversity loss and degradation of ecosystem services and address their restoration. The Plan sets out a concrete vision for the present and future of the conservation of natural heritage and biodiversity in Spain, by defining targets, waffles and actions promoting their conservation, sustainable use and restoration and establishes a coherent planning model. The conservation of biological diversity, or the sustainable use/promotion of components of biological diversity; the fair and equitable distribution/go of the benefits derived from the use of gené/cos resources.	biodiversity. This should minimise any unintended effects on biodiversity and natural heritage that could result from the development of new renewable electricity generation facilities, electricity distribution infrastructure and storage systems. The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, linked to the Strategic Plan for Natural Heritage and Biodiversity. On the other hand, the NECP includes measures that are expected to have a significant impact on biodiversity, soil and protection of the hydrological cycle. In particular: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.35. Forest sinks - Measure 1.36. Agricultural sinks
Conservation strategies and ges9on of endangered species	There are currently strategies for 17 species: Iberian imperial eagle, Cerceta pardilla (Focha and Malvasy), Iberian Desman, Lapa ferrugínea, Lince Iberian, Lobo, Náyade aunumerada, Oso brodo cantábrico, Oso brodo de los Pyrénéos, Pardela Baleares, Quebrantahuesos, Urogallo cantábrico, Urogallo pirenaico, European Vison, nacra, marine Tortugas and steppe birds. The content includes: the iden/definition of the species or threat treated; the geographical scope of application; a description of existing limiting or threat factors; the assessment of the actions taken; a diagnosis of the conservation status (in the case of species); the purposes to be achieved, with waffles/keys; the criteria for demarcating rural areas; criteria for compa/lifesaving requirements for species with land use and use; recommended actions to eliminate or my threat (s); and the frequency of updating.	The development of the NECP measures should not interfere with the territories of some species with a conservation strategy. In any case, the measures set out in the strategies must be considered, taking into account the conservation of both the species and its habitat. The NECP will promote additional measures for the conservation and promotion of native biodiversity and ecosystems, linked to endangered species, especially those with specific conservation strategies. Among these measures are: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - EAE of the NECP.
	The development of renewable energies provided for in this NECP must be Compa/Compa in accordance with the criteria set out in relation to natural heritage and	

Instrument for and the planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP objections to the planning instrument
National State Strategy for Green and Connectivity Infrastructure and Ecological Restoration	Green Infrastructure is an 'ecologically coherent and strategically planned network of natural and semi-natural areas and other environmental elements, designed and built up to preserve ecosystems and maintain the services they provide. Includes 'green' wsic spaces and other elements in land (natural, rural and urban) and marine areas'. It regulates the implementation and development of the Green Infrastructure in Spain, establishing a harmonised administrative/legislative and technical framework for the whole of Spain, including the waters Marí/mas under national sovereignty or jurisdiction. The Strategy sees Green Infrastructure as an ecologically coherent and strategically planned network of natural and semi-natural areas and other environmental elements, designed and gges/waves for the conservation of ecosystems	and the maintenance of the services they provide. The document on 'Science and Technical Basis for the State Strategy for Green Infrastructure and Green Conec/Effectiveness and Restoration' (which is a scientific-technical document) includes a conceptual framework, a legislative framework and a diagnosis/diagnosis, which can be of interest when planning the location of actions (mainly those resulting from new electricity generation facilities). The NECP mediated in line with this strategy, such as: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.35. Forest sinks - Measure 1.36. Agricultural sinks
Spanish Forestry Plan (SFP) 2022-2032	Implementing Law 43/2003 on Montes. It is the overall framework for forest pollen/ca, Compa/ble with socio-economic, cultural, pollen and environmental conditions. With/have a number of beds/keys, including: to promote the protection of the territory in general, and of the mountains in pair/cular areas, from the action of erosive processes and soil degradation by restoring protective plant cover and its complementary actions, extending the wooded area for protection purposes. At the same time, increase carbon sequestration in forest biomass to help mitigate climate change. Various measures in the NECP are in line with and reinforce the Spanish Forestry Plan, in terms of the creation of wooded areas, the prevention of forest fires, the River/ón de conifers or hydrological and forest restoration in areas with a high risk of erosion, measures which in turn contribute to my/our climate change. Moreover, they enable the rural environment to be revitalised and my/my/my risk of depopulation, contributing also to a just transition. Some of these measures are: - Measure 1.1. Development of renewable	energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.35. Forest sinks

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Forestry strategy Spanish (SPV) horizon 2050	The Spanish Forest Strategy (Spanish Forest Strategy) for 2050, as a reference document for establishing Spanish forest polí/ca, is drawn up in response to the mandate of Law 43/2003 on forestry, to be drawn up and updated. The review has been carried out with the main bullet point/roof of woodland/waves: well-preserved ac/strongly, more resilient to climate change, protected from major threats (forest abandonment, fires, diseases and pests) and providing ecosystem goods and services to enable the green transition His/her beach/lives include: supporting the conservation of forest areas and resources, improving the conservation status of certain forest ecosystems, strengthening the protective role of forests, my/her effects of climate change, boosting the circular bioeconomy, modernising and valuing forest production chains, paving the way for/anticipating pollen/energy transition and decarbonisation, and contributing to the sustainable socio-economic development of the rural environment, among others.	The measures in the PNIEC for forest restoration are in line with the Spanish Forest Strategy. However, measures in the NECP that may affect forest stands will be carried out in accordance with the forest resource management plans per/nentes, and under the premise of conservation and protection of forests. These are: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.35. Forest sinks
Basic guidelines Sustainable Forest Ges9on Common (DBCGFS)	The Common Basic Guidelines for Sustainable Forestry Gges/on Forestry (DBCGFS) are drawn up, after consulting the Autonomous Communities, in order to respond to the mandate of Law 43/2003 on forestry, to be drawn up in relation to the following aspects: - Adapting the sustainability criteria and indicators to the forests, assessing them and monitoring them, in accordance with the criteria laid down in international resolutions and conventions to which Spain is a party. - The minimum content of the instructions for the management and use of woodland in order to garden/build their sustainable gods. The purpose of the instructions for forest management and harvesting is to establish the guiding principles, criteria and requirements that must be complied with by all woodland instruments in the woodlands located in each Autonomous Community within the framework of sustainable forestry, to develop their minimum structure and contents, and to regulate their development and the procedures for approval, review, amendment and monitoring.	The NECP contributes to the adaptation and construction of forest resilience to climate change of forest sinks, which is perfectly aligned with a sustainable forest gge, which is the single aim of the DBCGFS. Measures that influence this are: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.35. Forest sinks

Instrument for planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP and the objections to the planning instrument
National forestry accounting plan for Spain, including reference forest level 2021-2025	This plan accounts for removals from the national forest stand and proposes a forest reference level (FRL) for the periods 2021 to 2025 and 2026 to 2030.	The NECP contributes to the adaptation and construction of forest resilience to climate change of forest sinks, which contributes to the achievement of the wafer (s) of the Forestry Accounting Plan for Spain, thereby strengthening its wafer (s). Measures that influence this are: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2. Development of renewable energies Committed to the territory and rural development - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.35. Forest sinks
United Phenological monitoring of the Spanish Biosphere Reserves	The phenological monitoring programme of the Spanish Biosphere Reserves Network is an educated citizen science project aimed at students, educators, naturalists, scientists and interested people. Seeks to transcend the values of Biosphere Reserves and mo/Var the study and observation of nature as a basis for knowledge and scientific method. The torque/cipation mechanism consists of monitoring common species of fauna and flora in the biosphere reserves with a view to analysing long-term changes (advances or delays) on the dates on which the biological events characterising the species studied take place: migration, flowering, reproduction, etc.	Network and the Autonomous Body of National Parks) is a citizen science project that contributes to raising awareness and raising awareness of climate change, by observing phenological changes in biosphere reserves. The NECP, especially in Measure 1.29. Generating knowledge, dissemination and awareness, it presents synergies with the phenological monitoring programme, in terms of its viewpoint/dissemination body and citizen pair/anticipation.
Master plan of National parks	The Plan sets out the basic guidelines for the planning, conservation and coordination of national parks. It includes their strategic glues/tools on conservation, public use, inventions/twigs, monitoring, training and awareness-raising, as well as the work on cooperation and collaboration at both national and international level.	The NECP does not present any measures or actions in the National Parks. Therefore, no interaction with its Master Plan is foreseen.
Biodiversity and Science Strategy (EByC)	The main mission of the EByC is to 'organise, within the framework and as part of the implementation of the Spanish Strategy and the Spanish Plan for Science, Technology and Innovation (EECTI and PECTI), a system that favours the generation and transfer of knowledge on biodiversity and ecosystem services, coordinated and inclusive, of quality, inclusive and effective, covering the needs of planning and the need for them to achieve their protection, conservation, sustainable use, restoration and their economic and social value'.	The measures in the NECP are in line with the Biodiversity and Science Strategy, as they focus on tackling climate change or influencing models for economic and production transformation or creating equality and territorial cohesion. Some of these measures are: - Measure 1.29. Knowledge generation, dissemination and awareness raising
	The phenological monitoring programme (promoted by the Spanish Biosphere Reserves	

Instrument for planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP and the objectives of the planning instrument
Conservation strategy for endangered birds linked to agro-steppe environments in Spain	The Strategy sets out the guiding criteria and guidelines for the conservation of steppe and farmland birds that are in an unfavourable conservation status in Spain. Their obje (s) are the recovery of these species to resee their Nega/va situation for the definition of Critical Areas, as well as Areas of Importance including Sites of Interest, Food Areas and Post-Reproduc Concentration Areas/Vans and Winter Areas.	Increased pressure for the construction of new infrastructure, such as wind and solar farms, may result in a net loss of relevant habitat area in the strategy as a threat to steppe birds, if these developments are particularly concentrated in steppe areas. It is therefore particularly important to take into account the areas identified in the strategy in relation to the measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of renewable energies Committed to biodiversity and protection of ecosystems

In addition to the instruments indicated above, the following may also be highlighted because of their relevance:

- Action Plan on pathways for the introduction and spread of invasive alien species in Spain, 2021
- GesAón plans for Natura 2000 sites
- Strategies and plans for conservation and restoration of protected species
- GesAón plans for terrestrial Natura 2000 sites

6. Coastal and marine environment

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the PNIEC with the Objectives of the instrument of planning
Marine Strategy for North Atlantic demarcation 9ca	It is the main planning instrument, created under Direc/va 2008/56/EC of 17 June 2008 establishing a framework for community action for polí/ca in the marine environment (Direc/va Framework on Marine Strategy) and transposed into the Spanish standard/vo system by Law 41/2010 of 29 December on the protection of the marine environment, aimed at achieving good environmental status of the marine environment in the North Atlantic **marine demarcation 9ca.** At present, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus starting the second cycle of marine strategies. The strategy provides the general framework with which the different sectoral pollen (s) and actions administered (s) having an impact on the marine environment must comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of the water, the determination of good environmental status, the setting of the environmental glue (s), a monitoring programme and another one of measures to achieve such buffer (s). It comprises the marine environment between Spain and France in the Bay of Biscay and the northern boundary of the waters under jurisdiction between Spain and Portugal.	report/feasibility with the marine strategies to avoid possible negative/vos environmental impacts. Special attention is needed to develop the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new renewable power generation facilities for demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13 Decarbonisation of Mari/mo Transport - Measure 1.22 Individual projects and strategy for sustainable energy on islands - Measure 4.4. Increasing electricity interconnection in the internal market
Marine Strategy for the South 9ca demarcation	It is the main planning instrument (created under Direc/va 2008/56/EC of 17 June 2008 establishing a framework for community action for polí/ca in the marine environment (Direc/va Framework on Marine Strategy) and transposed into the Spanish standard/vo system by Law 41/2010, of 29 December, on the protection of the marine environment, aimed at achieving good environmental status of the marine environment in the South African **marine demarcation 9ca.** At present, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus starting the second cycle of marine strategies. The strategy provides the general framework with which the different sectoral pollen (s) and actions administered (s) having an impact on the marine environment must comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of the water, the determination of good environmental status, the setting of the environmental glue (s), a monitoring programme and another one of measures to achieve such buffer (s). It comprises the marine environment between the boundary of the waters under jurisdiction between Spain and Portugal in the Gulf of Cádiz and the meridian passing through Cape Espartel.	The measures foreseen in the NECP that will be developed in the marine environment of the Sudatan/ca demarcation will be subject to the Compa report/feasibility with the marine strategies to avoid potential negative/vos environmental impacts. Special attention is needed to develop the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new renewable power generation facilities for demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13 Decarbonisation of Mari/mo Transport - Measure 1.22 Individual projects and strategy for sustainable energy on islands
	The measures provided for in the NECP that will be developed in the marine environment of the North Atlantic demarcation/will be subject to the Compa	

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the PNIEC with the Objectives of the instrument of planning
Marine Strategy for Strait and Alboran demarcation	It is the main planning instrument (created under Direc/va 2008/56/EC of 17 June 2008 establishing a framework for community action for polí/ca in the marine environment (Direc/va Framework on Marine Strategy) and transposed into the Spanish standard/vo system by Law 41/2010 of 29 December on the protection of the marine environment, aimed at achieving good environmental status in the marine environment in **the Estrecho and Alborán marine district.** At present, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus starting the second cycle of marine strategies. The strategy provides the general framework with which the different sectoral pollen (s) and actions administered (s) having an impact on the marine environment must comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of the water, the determination of good environmental status, the setting of the environmental glue (s) to be achieved, a monitoring programme and a programme of measures to achieve such glue (s). It comprises the marine environment between the meridian passing through the Cape of Espartel and an imaginary line 128° to the meridian passing through Cape Gata, as well as the marine environment in which Spain exercises sovereignty or jurisdiction in the areas of Ceuta, Melilla, Chafarinas Islands, Perejil Island, Veneto de la Gomera and Alhucemas parins and the island of Alborán. The measures provided for in the NECP to be implemented in the marine environment of the	Strait and Alboran demarcation will be subject to the Compa/Compa report with the marine strategies to avoid possible negative/vos environmental impacts. Special attention is needed to develop the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new renewable power generation facilities for demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13 Decarbonisation of Mari/mo Transport - Measure 1.22 Individual projects and strategy for sustainable energy on islands

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the PNIEC with the Objectives of the instrument of planning
Marine Strategy for the Offshore demarcation 9-Balearic	It is the main planning instrument (created under Direc/va 2008/56/EC of 17 June 2008 establishing a framework for community action for polí/ca in the marine environment (Direc/va Framework on Marine Strategy) and transposed into the Spanish standard/vo system by Law 41/2010 of 29 December on the protection of the marine environment, aimed at achieving the good environmental status of the marine environment in the Balearic **9-Balearic marine district.** At present, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus starting the second cycle of marine strategies. The strategy provides the general framework with which the different sectoral pollen (s) and actions administered (s) having an impact on the marine environment must comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of the water, the determination of good environmental status, the setting of the environmental glue (s) to be achieved, a monitoring programme and a programme of measures to achieve such glue (s). It comprises the marine environment between an imaginary line 128° from the meridian passing through Cape Gata, and the boundary of the waters under jurisdiction between Spain and France in the Gulf of Lion.	Compa report/feasibility with the marine strategies to avoid potential negative/vos environmental impacts. Special attention is needed to develop the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new renewable power generation facilities for demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13 Decarbonisation of Mari/mo Transport - Measure 1.22 Individual projects and strategy for sustainable energy on islands
Marine strategy for the Canary Islands demarcation	It is the main planning instrument (created under Direc/va 2008/56/EC of 17 June 2008 establishing a framework for community action for polí/ca in the marine environment (Direc/va Framework on Marine Strategy) and transposed into the Spanish standard/vo system by Law 41/2010 of 29 December on the protection of the marine environment, aimed at achieving the good environmental status of the marine environment in the **Canary Islands marine district.** At present, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus starting the second cycle of marine strategies. The strategy provides the general framework with which the different sectoral pollen (s) and actions administered (s) having an impact on the marine environment must comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of the water, the determination of good environmental status, the setting of the environmental glue (s) to be achieved, a monitoring programme and a programme of measures to achieve such glue (s). It includes the marine environment around the Canary Islands in which Spain exercises sovereignty or jurisdiction.	The measures provided for in the NECP to be carried out in the marine environment of the Canary Islands district will be subject to a report by Compa/Feasibility with marine strategies to avoid possible negative/vos environmental impacts. Special attention is needed to develop the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new renewable power generation facilities for demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13 Decarbonisation of Mari/mo Transport - Measure 1.22 Individual projects and strategy for sustainable energy on islands
	The measures provided for in the NECP that will be developed in the marine environment of the Vlevan/Non-Balearic RBD will be subject to the	

Marine Spatial Planning Plans 9mo (MEOP) of the five Spanish marine districts	Direc/va 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for the planning of Mari/mo space was transposed into Spanish law by Royal Decree 363/2017 of 8 April establishing a framework for the planning of the Mari/mo space, in application of Law 41/2010 of 29 December on the protection of the marine environment, which provides that the Government may adopt guidelines common to all marine strategies in order to ensure/ensure the coherence of their wings/vities, such as the management of VCs/vities that are carried out or may affect the marine environment. The standard stipulates that five spatial plans must be drawn up, one for each of the five marine districts established in Law 41/2010 on the protection of the marine environment. The way in which the Mari/mo spatial plans are drawn up is to promote the sustainable development and growth of the Mari/mos sectors in a manner that is compatible with respect for the values of marine sites, the preservation of their functionality and the sustainable use of resources. The Mari/mo spatial plans include a number of specific beds/beds, including those related to the hydrocarbon and renewable energy sectors, namely: - HC.1. Ensure that future uses and vities take into account the need to ensure/maintain the integrity of the pipelines considered as critical infrastructure. - HC.2. Make it easier for future pipeline projections to take into account the location of VAs/vities requiring the or or lifespan of space on the seabed, as well as the need to maintain the integrity of the seabed, especially those with protected, biogenic or vulnerable habitats. - HC.3. Not to grant new exploration authorisations, hydrocarbon inventions/purse permits or hydrocarbon exploitation concessions in the territorial sea, exclusive economic zone and platform with/nental. - R.1. IDEN/End the areas with the highest potential for offshore wind development in each offshore district. - R.2: Ensure that the spatial location of the areas with the highest potential for offshore wind energy development does not compromise the conec/lifetime of ecosystems, especially migratory species corridors. EMPs analyse and organise human vities in marine areas in order to achieve ecological, economic and social beds/beds. Without exclusionary zoning in the MEOPs, priority use areas (ZUP) have been identified for ACs/vities of general interest and require specific occupation; and High Potential Areas (HPAs) for certain ACs/sectoral vities or where potential in/out of the future is a priority. As in the case of the Marine Strategies, the measures provided for in the NECP that are carried out in the marine environment will be subject to their compatibility with them in order to avoid possible negative/vos environmental impacts. Special attention requires the development of the following measures: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.3. Development of new electricity-generating installations using renewable energy - Measure 1.7. Adaptation of electricity grids for the integration of renewables - Measure 1.13. Decarbonisation of Mari/mo transport - Measure 1.22. Unique projects and strategy for sustainable energy on islands On the other hand, the development of these measures must be consistent with the planning established, in particular with: - ZUP for inventions/development and innovation (R & D & I) in relation to measure 1.22. Unique projects and strategy for sustainable energy on islands - SPA for the development of offshore wind energy in relation to measure 1.3. Development of new renewable electricity generation facilities.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
	Similarly, the plans include zoning including areas of high potential for the development of offshore wind energy (or ZAPER), as well as associated planning criteria to ensure/ensure the sustainable coexistence of this AC/vision with the conservation of the marine environment and with other uses and vities developed in the marine environment. Finally, it should be noted that the plans include three specific measures for offshore wind: • Measure ER1: Analysis and modelling of the landscape/co impact of offshore wind energy infrastructure in Spanish waters. • Measure ER2: Analysis of the fisheries sector potentially affected by the development of offshore wind energy in the areas proposed in the MEOP. • Measure ER3: Analysis of the potential effects of offshore wind farms on marine ecosystems.	
Strategic Plan for Spanish Aquaculture 2014-2020	In development of the Strategy for the Sustainable Development of Spanish Aquaculture. This is the framework for action for Spanish aquaculture, and/or as a guide/I propose lines of action that will enable the growth and sustainable development of Spanish aquaculture, from its social, environmental and economic point of view.	The Spanish Strategic Plan for Aquaculture determines the size of the different coastal marine areas for the development of aquaculture and restricts those that may interfere with aquaculture farming. Therefore, the development of the NECP measures must be in line with the zoning provided for in that plan. Measure 1.1 Development of renewable energy sources has an impact on biodiversity and ecosystem protection.
Spain's contribution to the Strategic Guidelines for a more sustainable and competitive EU Aquaculture 2021-2030 (EsAcui)	This is a key strategic instrument to address the challenges of Spanish aquaculture in the period 2021-2030, iden/ficking in detail common problems, analysing dis/NTAS ways of addressing them and OP/measuring the efforts to be made.	EsAcui 21-30 implements a strategic vision of the European Maritime, Fisheries and Aquaculture Fund (EMFAF) that ensures the effective and efficient use of aid to boost aquaculture in Spain in a defined way and restricts VAs/vities that may interfere with aquaculture farming, and therefore the development of the NECP measures must be in line with the zoning foreseen in that plan. Measure 1.1 Development of renewable energy sources in line with biodiversity and the protection of ecosystems has an impact on this aspect.
State Plan for the Protection of the Sea Anti-Pollution Ribera (Ribera Plan)	The Plan shall apply to cases of accidental or deliberate marine pollution, whatever its origin or nature, affecting or likely to affect the coast. It includes sensitivity atlas on the Spanish coast and an analysis of its vulnerability and risk, as well as the logis/cas and ges/ón capacities needed to cope with an episode of pollution of dimension and intensity means (s). The fight against marine pollution along the coast focuses on three aspects: prevention, organisation of response, and coordination of resources and staff between administrations.	The NECP provides for measure 1.13. Decarbonisation of Mari/mo transport, in line with this Plan, which consists of decarbonising the Mari/mo sector with the least carbon, social and economic leakage impact.

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the PNIEC with the Objectives of the instrument of planning
	It has two general waffles/beds: Increase the resilience of the Spanish coast to climá/co change and climate/ca variability and to integrate adaptation to climá/co change into the planning of the Spanish coast.	with the sustainability principles set out in the Strategy, especially as regards the reduction of air pollution and greenhouse gas emissions.
	Overall, the Strategy aims at environmental improvement of the coast and coastline against the effects of climate change and sets out a number of sustainability principles.	The measures envisaged in the NECP will achieve a 32 % reduction in greenhouse gas (GHG) emissions by 2030 compared to 1990.
Local Adaptation to Change Climá9co off the coast Spanish 2016	The strategy proposes a system of indicators and indices that provide obased/va information for the establishment of pollen and action strategies to correct and prevent the effects of climate change on the Spanish coast.	The NECP provides for: Measure 1.1 Development of renewable energies Committed to biodiversity and protection of ecosystems Measure 1.2. Development of renewable energies Committed to the territory and rural development Measure 1.3. Development of new renewable power generation facilities, demonstration projects for developing technologies (specifically offshore wind and offshore energy) and deployment of offshore wind farms.
Strategic study Environmental of the Litoral Spanish for the installation of Marine	The work of the Strategic Environmental Study is the identification of the areas in the public domain Marí/mo Terrestrial which, for environmental purposes, meet favourable conditions for the installation of offshore wind farms (with a power greater than 50 MW, some/two of the area reservation procedure laid down in Royal Decree 1028/2007, which needs to be updated). To this end, it establishes, through a geographical representation, the following zoning: a) Suitable areas: the areas most suitable for the establishment of offshore wind farms because their environmental effects are, in principle, reduced compared to their benefits. b) Exclusion areas: the areas to be excluded from the process because their potential environmental effects mean/vios, or conflic/lively with other uses of the marine environment. c) Eligible areas with environmental constraints: the areas in which the effects or conflicts identified should be analysed in detail during the environmental assessment procedure of each individual project. Furthermore, the Study provides environmental criteria for the design of offshore wind farm projects to be developed in the future. The gas emission reduction measures envisaged in the NECP contribute to curbing the effects of climate/co change (sea level rise, acidification, extreme weather events, etc.). On the other hand, the NECP is perfectly in line	In Measure 1.4. Development of innovative renewable energy installations, the NECP envisages the need to create a roadmap for offshore wind and offshore energy in Spain, with the aim of reducing the administrative/critical barriers to the development of this renewable energy source. In Measure 1.7. Adaptation of electricity grids for the integration of renewables, the NECP also provides for the necessary offshore electricity infrastructure planning associated with the deployment of offshore wind and, to a lesser extent, offshore energy. The Strategic Environmental Study of the Spanish Litoral for the installation of Marine Wind Parks is a reference to consider the location of offshore wind farms. In any case, this is an unupdated study and zoning based on environmental and technical feasibility aspects, and in 2009 offshore wind energy was not considered on floating platforms.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Master Plan for the Network of Protected Marine Areas (RAMPE)	This plan is developed with the dual aim of facilitating the operation of the RAMPE, created in 2010, and building a network capable of bringing added value to the sites that are part of it in terms of conservation and restoration of natural heritage and biodiversity. To this end and among other measures, potential ecological and conec/lifetime corridors will be analysed, either by marine demarcation or at regional and global level. Pilot projects to adapt fishing gear will also be developed or the interactions and impact of both fishing and non-fishing vities will be assessed (recrea/vas and Turis/cas, anchors and navigation, AC/port vities, aquaculture, renewable energies, view/two or extraction of sand and other minerals), among others.	This plan is in line with the NECP, as it aims to promote an ecologically representative/va and well-connected network that contributes to the favourable conservation of its species, habitats and ecosystems, and ensures that the uses and ACs/vities developed in these areas are shared with the conservation beds/rods. Measure 1.1 Development of renewable energies is in line with biodiversity and the protection of ecosystems. This is also done by measure 1.13 Decarbonisation of Marí/mo transport

In addition to the instruments indicated above, the following may also be highlighted because of their relevance:

- Proposal for the adaptation of the marine Natura 2000 network, 2021
- GesAón plans for marine Natura 2000 sites
- Action, conservation and restoration plans for protected marine species
- Strategic Environmental Study of the Spanish Litoral for the Installation of Marine Wind Parks 2009

7. Landscape and cultural heritage

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
European Convention of Landscape	The aim of the Convention is to protect, protect and organise European landscapes by recognising them as a common resource. Among your waffles/beds it is to promote the protection, security and organisation of such protection, as well as to organise European cooperation in this field.	The NECP sets out measures that can be in line with the European Landscape Convention's wafer (s). These include Measure 1.35. Forest sinks, including improvements in forest systems, dehesas and riverbanks. However, there are other measures that will have to pay attention to the provisions of the Convention on Protection, Gges and Landscape Planning, with the aim of minimising the impact on the landscape and developing environmental integration measures: – Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems – Measure 1.2. Renewable energy development comparison with the territory and rural development – Measure 1.3. Development of new electricity-generating installations using renewable energy - Measure 1.11. Framework for the development of renewable thermal energy - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.22. Unique projects and strategy for sustainable energy on islands The actions and measures provided for in the NECP must pay attention to the provisions of the Convention on Protection, Gges and Landscape Planning. Impacts on the landscape should be minimised and environmental integration measures developed.

8. Land use, spatial planning and socio-economic development

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can interacting the NECP planning	Significant Interactions of the PNIEC with the Objectives of the instrument of
Strategic Plan for the Common Agricultural Policy (CAP Strategic Plan) for Spain for the 2023 period2027	The commitments made at international level through the Paris Agreement and the 2030 Agenda for Sustainable Development are reflected in the CAP. European agriculture joins the agenda of global disawls, including those linked to climate and the environment, but also to health, nutrition, animal welfare, quality and sustainability of our food system. Among its priorities, the promotion of a smart, resilient and diversified agricultural sector that ensures food security, stepping up environmental care and climate action, contributing to the achievement of the EU's climate and environmental gauges/beds; and strengthening the partner – economic fabric of rural areas.	The NECP iden/consolidates the challenges and Agriculture, through the CAP, can play a very strong role in meeting the climate and environmental challenge, ensuring/placing food security on the same footing. Cross-compliance (a set of legal and agricultural rules with which farmers must comply as a condition for receiving direct payments) promotes prác (s) such as the efficient construction of soils, which is specifically included in the NECP. Some measures, which contribute to the reduction of GHG emissions and to the environmental integration of agriculture, include: - Measure 1.8. Development of self-consumption with renewables and distributed generation - Measure 1.32. GHG emission reduction in the agriculture and livestock sectors - Measure 1.36. Agricultural sinks - Measure 2.14. Energy efficiency in farms, irrigation communities and agricultural machinery.
Sustainable Development 2030	The Sustainable Development Strategy aims for a more coherent society in the rational use of its resources, socially fairer/more cohesive and territorially balanced. Your main focus is to make Agenda 2030 a reality.	
National Rural Development Programme 20142022	Your core glue (s) are: promoting agri-food partnership/integration, encouraging the creation of producer groups and organisations, and encouraging industrial revitalisation of the agri-food sector through cooperation. Encouraging and promoting the integration of agri-food partners, cons/tools of great importance for their competitiveness; redimensioning, modernisation and internationalisation.	Various measures in the NECP are in line with and reinforce the National Rural Development Plan. In this context, measures relating to self-consumption (1.8) and the development of renewable energy communities in rural areas (1.2), which promote energy access and security of supply, are particularly relevant.

opportunities throughout its five dimensions: decarbonisation of the economy, including renewable energy; energy efficiency/ca; energy security/ca; the internal market in energy and inventions, innovation and competitiveness. It greatly strengthens the priority areas of the Sustainable Development Strategies, such as climate change, clean energy, transport and public health, in particular. It also attaches particular importance to equity and the fight against energy poverty.

The measures set out in the Plan will achieve a 31 % reduction in greenhouse gas (GHG) emissions by 2030 compared to 1990.

The NECP boosts energy efficiency and thus reduces total energy demand and its/tution of fossil Combus/bles by other indigenous sources (energy renewable; essentially).

As such, the measures in the NECP contribute posi/strongly to an improvement in air quality, through the reduction of air pollutants, with clear benefits for human health.

instrument of	Purpose of requirements of the planning with which you can plan interacting the NECP	Significant interactions between the NECP and the objectives of the planning instrument
Sectoral plan for Nature tourism and Biodiversity 2014—2020	The Plan deepens and consolidates the concept of sectoral integration as a way forward in its conservation and sustainable use. Seeks, through one of its targets, to integrate biodiversity into sectoral pollen. Your glue (s) are: – – Develop tourism products from sustainable nature – – Promoting sustainable products that incorporate into the Natura 2000 network - Improving the consideration of biodiversity in nature tourism VAs - Improving knowledge and information on nature tourism	Spain undertakes to ensure responsible natural heritage, in particular the protection of its biological diversity, which is one of the highest and most valuable in Community Europe. The results of the NECP in terms of GHG emissions/have a potential effect on nature and biodiversity, especially on the ecosystems most vulnerable to climate/co change, such as mountain areas, coastlines or water/c systems. In relation to tourism, measures to promote self-consumption and boost renewables (electric and thermal use) in accommodation and installations, as well as efficiency measures (building and transport) strengthen a more sustainable nature tourism model. On the other hand, the development of the measure for new electricity generation installations with renewables, which represents an additional watchdog in rural areas, should minimise its impact on the landscape, biodiversity and natural values of the rural environment. The NECP will promote additional measures for the conservation and promotion of native biodiversity and aquatic ecosystems, linked to the Spanish Strategic Plan for the Conservation and Racial Use of Wetlands. The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, linked to the Strategic Plan for Natural Heritage and Biodiversity.

Instrument for planning	Objectives or prescriptions of the instrument planning with which you can	Significant Interactions of the PNIEC with the Objectives of the instrument of
		The Plan highlights climate change as an additional challenge in complying with other Sustainable Development Goals (SDGs) such as those related to water, underwater life or terrestrial ecosystems (6, 14, 15), as well as the cross-cutting nature of measures to combat it, allowing synergies with all waffles/ropes. In this case, the NECP has analysed the extent to which the dis/NTAS measures contained therein contribute to the SDO (see ANNEX E).
Action plan for the implementation of the 2030 Agenda. Towards a Spanish Sustainable Development Strategy	The 2030 Agenda for Sustainable Development was unanimously adopted by the 193 UN Member States in 2015. The Agenda contains 17 Sustainable Development Goal (SDG), 169 targets, 232 indicators, focusing on people, planet, prosperity, peace and alliances, the means for their implementation and the monitoring and review mechanism at national, regional and global levels. Each Member State should promote the implementation of the Agenda through the specific instruments it considers: national strategies, plans or pollen. In line with the UN Agenda 2030 Agenda Sustainable Development Observers, the Action Plan is a programme-oriented document for action, prior to the formulation of a long-term sustainable development strategy. Shares the UN's 17 Sustainable Development Goals, which are global targets for eradicating poverty, protecting the planet and ensuring prosperity for all.	The measures in the five dimensions of the NECP are in line with and share some of the glues/rounds of the Action Plan for the implementation of the 2030 Agenda, along the lines of the SDGs (Sustainable Development Object/Roles). The NECP has very posi/close synergies with the glue (s) of the plan. It is described as the central hub (s) of the Plan: - SDG 13. Take urgent measures to combat climate change and its effects - SDG 7. Securing access to affordable, secure, sustainable and modern energy for all In addition, the following interactions with other waffles/beds are highlighted: - SDG 17. Strengthen the means of implementation and revitalise the global partnership for sustainable development - SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation - SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable - SDG 12. Secure sustainable consumption and production patterns - SDG 8. Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all - SDG 10. Reduce inequality within and among countries
Strategy for the Organic production 2018-2020	Instrument to encourage the agri-food production of environmentally friendly quality products. It has the following waffles/loops: - Promote domestic consumption and improve the marketing of organic products. - Contribute to a better sectoral backbone of organic production. - Support the growth and consolidation of organic production, with a particular focus on organic livestock farming and the industrial sector - Study the role of organic production in pollen/climate change and adaptation to climate change.	This strategy/synergies with the NECP in the area where organic production is being dealt with with the focus/roof of environmental improvement and its adaptation to climate change.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Natural Pathways Programme (Since 1993)	The Natural Pathways Programme aims at the promotion, valorisation and knowledge of natural paths and green roads (those carried out on a/water rail platform) among the population. It seeks to contribute to the development of an economic partner in rural areas, by reu/paving traditional disused paths or by opening new paths. It also encourages the population to come closer to nature and rural areas, also responding to the social demand for Turis/alternating/live services.	No interactions with the Natural Road Programme are foreseen in the development of the NECP.
National plan for Irrigation	It aims at the development of rural areas, integrating ac/vity produc/va with the conservation of natural resources and respect for the environment, in accordance with the guidelines for supporting the territory in order to avoid the loss of rural population. These include improving farmers' living standards, ordering agricultural production and markets, improving infrastructure for the distribution and application of irrigation water, and incorporating environmental criteria in the Gges/Wars and Waters to prevent their degradation.	The agriculture sector is an electricity-intensive sector and energy costs are a key element in the pricing of irrigated agricultural products. The NECP promotes energy self-consumption as a measure of competation.It makes it possible to reduce and stabilise energy costs in the long term. It also aims to reduce energy consumption in farms and irrigation communities through the modernisation of existing facilities. Some measures in this area: - Measure 1.8. Development of self-consumption with renewables and distributed generation - Measure 2.14. Energy efficiency in farms, irrigation communities and agricultural machinery.
Strategy for the Digitalisation of the Agri-Food and Forestry Sector and the Rural Environment	The Strategy for the Digitalisation of the agri-food and forestry sector and the rural environment sets out the strategic lines and measures needed to boost the digital transformation of the agri-food and forestry sectors and the rural environment, as well as the instruments envisaged for their implementation. Its general aim is to remove or reduce the technical, legislative, economic and formal barriers currently in place, thus contributing to the leadership of an economically, socially and environmentally sustainable agri-food sector, and to the population of rural areas, making it more ATRAC/vo, living, dynamic and diversified, generating wealth and quality employment, paying particular attention to young people and women.	No interactions with the Strategy for the Digitalisation of the Agri-food, Forestry and Rural Areas are foreseen in the development of the PNIEC.
Plan 130 Measures against the Demographic Challenge	It is a cross-cutting programme for action on the demographic challenge and the fight against depopulation, which is the result of coordinated action by all ministerial departments. The 130 Measures against the Demographic Challenge are fully aligned with the Recovery, Transformation and Resilience Plan, and its four priority axes, to ensure/integrate small municipalities into a green, digital and inclusive recovery. The different measures/aim to improve the territorial cohesion of the country, close the urban/rural divide and boost action in the areas most affected by inequality: our small municipalities and rural areas as a whole.	As regards the demographic challenge, the NECP highlights measures targeting municipalities with fewer than 5.000 inhabitants in areas such as improving energy efficiency in buildings and public infrastructure, generating and consuming renewable energy, boosting self-consumption and energy communities or sustainable mobility.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
National Strategy against Energy Poverty 9	The Strategy has been drawn up in compliance with the provisions of Royal Decree 15/2018 of 5 October on urgent measures for the energy transition and consumer protection. The Strategy sets out a definition of the situation of energy poverty and vulnerable consumers, diagnoses the situation in Spain, identifies policy areas and sets out ways of reducing this social problem.	The NECP promotes various measures to protect and strengthen the role of consumers and establishes a specific measure, which develops the strategy: – Average 4.2. Fight against energy poverty/ca In addition, the right to access energy is another fundamental axis of the change in the energy model. In this case, the potential of energy renovation of buildings and self-consumption systems – in conjunction with/linking self-consumption to compel/do – is highlighted for my/my situation of vulnerability and energy poverty.

9 Energy and industry

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
National Renewable Energy Action Plan in Spain (PANER) 2011-2020.	The National Renewable Energy Action Plan (NREAP) responds to the requirements and methodology of renewable energy Direc/va and is in line with the model of national renewable energy action plans adopted by the European Commission. It was also in line with compliance with the binding waffles/beds laid down in the Direc/va in force for 2011: achieving renewable sources of at least 20 % of final energy consumption in the year 2020 and a minimum 10 % share of energy from renewable sources in energy consumption in the transport sector by that year.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. It is in line with the NREAP. One of the main results of the NECP is the approach to increasing renewables over energy end-use in the economy as a whole, focusing mainly on the decarbonisation dimension of the current NECP. One of the main objectives set out in the NECP is to increase energy efficiency, reducing total energy demand and favouring the use of Combus/Fossil Combus by other indigenous users. (energy renewable; essentially).
National Energy Efficiency Action Plan 9 (NEEAP) 2017-2020	The purpose of the NEEAP 2017-2020 is to meet the requirement of Article 24.2 of Direc/va 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. The NEEAP sets out the energy consumption is/Mado, the energy efficiency measures planned and the improvements the country expects to achieve. The NEEAP presents energy efficiency measures in buildings, industry, transport, agriculture and fisheries. It also promotes high-efficiency cogeneration and district heating and cooling in processing.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. It is in line with the NEEAP. The measures included in the NECP in the energy efficiency/ca dimension will lose/will achieve a 41.6 % improvement in energy efficiency/ca in 2030.

of	Purpose of requirements of the instrument planning with which you can plan interacting the NECP	Significant interactions between the NECP and the objectives of the planning instrument
Energy Plan binding. **Renewables (PER)** AT**2011-2020.**	The RER includes the design of new energy scenarios and the incorporation of waffles/beds in line with Direc/va 2009/28/EC on the promotion of the use of energy from renewable sources, which establishes minimum shaft (s). The PER wafer/vo ul/m is to get the renewable sources account for at least 20 % of final energy consumption in the year 2020 and a minimum 10 % share of energy from renewable sources in energy consumption in the transport sector by that year.	The NECP is a planning tool that responds to the commitments made by Spain in response to the challenge of climate change. Their obje (s) and measures are consistent with the RER and are even more demanding. As a result of the NECP, the presence of renewables on energy end-use in the economy as a whole is 48 % in 2030. The NECP presents, in the decarbonisation dimension, specific measures for the promotion of renewable energy. To be noted: - Measure 1.1. Development of renewable energies Committed to biodiversity and protection of ecosystems - Measure 1.2 Development of renewable energies – Compa/obtainable with the territory and rural development - Measure 1.3. Development of new electricity-generating installations using renewable energy - Measure 1.8. Development of self-consumption with renewables and distributed generation - Measure 1.10. Decarbonisation of the industrial sector. - Measure 1.11. Framework for the development of renewable thermal energy - Measure 1.17. Plan for the repowering and remachining of existing renewable electricity generation projects. - Measure 1.20. Promotion of bilateral procurement and promotion of renewable electricity forward markets The NECP presents energy efficiency/ca measures in the transport sector (measures 2.1, 2.2, 2.3,2.4 and 2.5) which will contribute to the cumulative final energy savings waves for the period 2021-2030. As a result of the measures adopted in the NECP, 30 % of renewables in transport via electrification and biofuels are reached, above the 29 % required by the European Union for 2030.

Instrument for planning	Objects or requirements of the instrument planning with which you can interacting the NECP	Significant interactions between the NECP and the objectives of the planning instrument
Electricity transmission network development plan 2021-2026	The Plan provides for binding planning and indicative planning. The binding planning refers to the development of the transmission system in accordance with the guiding principles set out in Order TEC/212/2019, while the indicative planning includes the target scenario for electricity generation and supply. This indicative planning is fully reflected in the NECP. For the design of the planning, compliance and the generation and demand scenarios of the 2021-2030 National Energy Plan (NECP) have been carried out, applying a perspec/va integral and coordinated with this strategic planning. The plan aims to identify the development needs of the transmission network for several purposes: I lose the massive integration of new renewable generation at the pace necessary to reach the NECP waves in the medium and long term. Maintain and improve the security of supply of the Spanish electricity system in compliance with the provisions of the implementing legislation. Respond to new demand needs that are/are being addressed, including the supply of transport infrastructure such as railways or electrification of the Mari/mos ports. Reduce the technical structural constraints of the transmission network that require generation scheduling due to technical constraints. Addressing the needs of international interconnection and connection with and between non-peninsular territories.	The 2021-2026 Electricity Transmission Network Development Plan has been approved as a development of the NECP (measure 4.5. Electricity Transmission Network Development Plans 2021-2026 and 2025-2030). The electricity transmission network planning consists of a binding part, the network infrastructure to be built, and another indicates/goes with demand and generation projections. On this occasion, the part indicates the cons/beams of this NECP. The binding planning of the electricity transmission network will be adapted accordingly to compliance with the waffles/beds of this NECP and its demand forecasts and power park, so both instruments are fully aligned. The NECP is fully in line with the factors of the Plan, as it helps to improve supply, increase international connection capacity, and boost the development of renewable energies. Measures in this regard would be: - Measure 4.4. Increasing electricity interconnection in the internal market - Measure 4.5. Electricity Transmission Network Development Plans 2021-2026 and 2025-2030

Instrument for planning	Objects or requirements of the instrument planning with which you can interacting the NECP	Significant interactions between the NECP and the objections to the planning instrument
Proposals for the development of the Electricity Transmission Network with	The aim of the proposals is to advance the transition of the Spanish energy system in order to comply with the objectives of energy efficiency, renewable energy and climate change, as well as to put the Spanish system on the path defined by the European Commission for 2050, the intermediate step of which is compliance with the framework set by the European Union for 2030 on energy and climate change.	The planning of the electricity transmission network for the period 2021-2026 will be guided, among other guiding principles, by the fulfilment of the energy and climate commitments to be specified at national level in the NECP 2021-2030. distribution lines on Spanish territory, including mainland connections, non-peninsular systems and interconnections between island systems. The NECP deals with all of these aspects, as well as the development of gge/on mechanisms and storage of electric renewables that do not make it possible to see/two. The NECP provides for Measure 4.4 Increasing electricity interconnection in the internal market and Measure 4.5. Electricity Transmission Network Development Plan 2021-2026
General Guidelines for the New Spanish Industrial Poli9ca 2030	The General Guidelines of the New Polí/ca Industrial Española 2030 are framed by the Government's Agenda for Change and aligned with the Sustainable Development Goals. A sustainable and inclusive growth model that promotes stable and quality employment; an industrial pollen ac/is intended to transform our produc/vo model with three obje/vos: - The reindustrialisation of the economy, i.e. the development and enhancement of the various industrial sectors in order to increase their par/anticipation in GDP and employment. - The necessary transformation of the industrial fabric, especially small and medium-sized enterprises, to adapt it to a new context marked by the rapid evolution of digital technologies and growing international competition. - Adapting to the green transition in a twin view: on the one hand, exploiting the opportunities arising from it, with an impact on the move towards a more circular and decarbonised economic model; and, on the other hand, the anticipation and my impact that it can cause, thus ensuring an orderly and just transition. The integration of renewable generation into the electricity sector, both in the mainland and in non-mainland territories, makes it necessary to strengthen and grow transmission and	The NECP is a planning tool that responds to the EU's demand in the face of the challenge of climate change. It sets out challenges and opportunities throughout its five dimensions. One of the main targets presented in the NECP is the reduction of total gross GHG emissions in the industry sector (Combus/on), which reaches 17,5 $MtCO_2eq$. The promotion of the deployment of renewable energies, distributed generation and energy efficiency promoted by this NECP is characterised by being anchored to the territory. Therefore, its implementation will create significant investment and employment opportunities for the regions and districts of our country. The industrial, economic and employment opportunities that are being/are promoted and promoted in those districts and regions most affected by the energy transition and the decarbonisation of the economy are particularly relevant. Measures in this regard would be: - Measure 1.10. Decarbonisation of the industrial sector - Measure 2.6. Technology improvements and systems for non-energy-intensive/energy-intensive processes - Measure 2.7. Improvements in technology and gauging systems in energy-intensive/energy-intensive industries

Instrument for planning	Objects or requirements of the instrument planning with which you can interacting the NECP	Significant interactions between the NECP and the objectives of the planning instrument
SME Policy Policy Strategic Framework 2030	The Strategic Framework/is intended to improve the ability of small and medium-sized enterprises to meet the challenges of a global and digitalised economy and contribute to creating a climate conducive to their growth. Proposals are organised through seven levers: Entrepreneurship, Entrepreneurship and Talent, Regulatory Framework, Finance, Innovation and Digitalisation, Sustainability, and Internationalisation. These areas are accompanied by 50 lines of action characterised by their horizontal nature, affecting the development of all SMEs as a whole. The actions that will be eligible for funding should go to improving technology in industrial equipment and processes, or the deployment of ges/ón energé/ca systems. The purpose of the aid programme is to promote/promote the implementation of actions in the industrial sector that reduce carbon dioxide emissions and final energy consumption, by improving energy efficiency, thereby helping to achieve the reduction in energy consumption.	The achievement of the NECP waves on energy efficiency/ca and the generation of energy at par/r of renewable sources/have a potential impact on the competitiveness of the Spanish economy due to: • improved competitiveness in the industry on a par/cular basis, and in the business fabric in general, thanks to a reduction in energy/ca bills; • ensure in the long term energy costs that are less exposed to risks of price variability and are less exposed to the risks of price variability; • the Plan presents an opportunity for the development of a high value-added equipment and services industry. Measures 2.6 and 2.7. Improvements in technology and Gge/on industrial process systems aim to facilitate the penetration of final energy saving technologies, mainly in small and medium-sized enterprises (SMEs). Measures 5.1. Strategic action on climate, energy and mobility and 5.5. Public Procurement of Innovative Technology (CPTI) and pre-commercial technology (PPP), to foster innovation from public demand, are aligned with smart specialisation strategies to improve knowledge exchange between pollen actors and stakeholders, in particular by promoting the pair/anticipation of SMEs.
Spanish Strategy for the Development of the Energy Use of Forest Biomass 9	The strategy aims to promote residual forest biomass for energy purposes, as it considers that the introduction of a sustainable energy/co model, based on saving, efficiency and diversification of sources, requires a strong boost to the development of residual forest biomass as renewable energy.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Their obje/vos and measures are in line with the Spanish Strategy for the Development of the Energé/co Use of Forest Biomass. The NECP presents some measures to promote the use of biomass as a source of energy/ca, which contributes to the development of its wafer (s). The following measures are highlighted: - Measure 1.10. Decarbonisation of the industrial sector. - Measure 1.11. Framework for the development of renewable thermal energy - Measure 1.21. Specific programmes for biomass harvesting - Measure 1.33. GHG emission reduction in the Gases of Waste

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Local **Energy Safety 9ca** **National 2015**	Spain/has a characteristic energy/co profile: dependent on external resources and with a limited level of energy/ca interconnection, but at the same time, it has a comprehensive and diversified energy/co mix. The Energé/ca Security Strategy adopts a future-proof Perpec of the sector, assessing factors such as technological advances to generate and distribute energy, energy/ca interdependence and the influence of power changes on resource availability. In addition, the influence of the regulatory framework of the energy market on competition, competitiveness and innovation of companies. It is driven by the obje/end of energy security/ca, diversification of energy sources, security of transport and supply, and boosting energy/ca sustainability. As a fundamental part of the National Security System, Oblast 2 of the Energé/ca National Security Strategy establishes the need to 'consider all energy sources in order to maintain a balanced mix that correctly reflects all Spain's pairs/cularities and allows a certain amount of supply to be achieved, at competing prices, and within a sustainable model in which clean energy gradually becomes more important'.	The NECP promotes an intense reduction in energy dependency, especially with regard to the import of fossil Combus/bles, by implementing energy efficiency measures and developing indigenous renewable energy sources. In addition, the NECP has developed a dimension, with a package of measures, specifically aimed at energy security/ca. - Measure 3.1. Plan + Safety Energé/ca - Measure 3.2. Maintenance of minimum safety stocks of petroleum products and gas. - Measure 3.3. Reduction of energy dependency on islands. - Measure 3.4. Combus/alternating/vos recharging points. - Measure 3.5. Boosting regional cooperation. - Measure 3.6. Deepening the plans for with/emerging. - Measure 3.7. Planning for the safe operation of a decarbonised energy system - Measure 3.8. Strategic raw materials for the energy transition - Measure 3.9. Cybersecurity in the energy sector

10 Transport and mobility

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Secure, Sustainable and Connected Mobility Strategy 2030 (EMSSC)	National reference framework integrating coordination principles and tools to guide and provide coherence to sectoral pollen that facilitate sustainable and low-carbon mobility. Sustainable mobility means ensuring/ensuring that transport systems respond to economic, social and environmental needs, minimising their Nega/vas impacts. There are 48 measures structured in five areas: territory, transport planning and infrastructure; climate change and reduction of energy dependency; air quality and noise; safety and health; and Gges/on the application. Among the measures envisaged, particular attention is paid to promoting alternating mobility to private vehicles and the use of the most sustainable modes, noting the need to care for the implications of urban/ca planning for mobility generation.	The NECP is a planning tool that responds to the commitments made by Spain in response to the challenge of climate change. Their obje (s) and measures are in line with the Eems. The decarbonisation dimension of the energy/co system includes measures aimed at reducing emissions. The mobility and transport sector is the second largest sector to reduce its emissions in the period 20212030. Actions to improve energy efficiency in transport and sustainable mobility in cities have been aimed at encouraging a modal shift in the mobility of people towards the least energy-consuming modes, as well as other measures in this dimension: - Measure 2.2. Modal shift in freight transport with a higher presence of rail. - Measure 2.5. Electric vehicle pulse. - Measure 2.11 Efficiency energy in buildings in the tertiary sector. In addition, the NECP has included actions aimed at improving the efficiency of the vehicle fleet by renewing fleets and incorporating technological advances, as well as actions aimed at the efficient use of means of transport.

Planning instrument	Objects and/or requirements of the planning instrument with the which can interact with the NECP Significant interactions of the NECP	with the Objectives of the instrument of planning
	The Energy Efficiency Strategyaims to reduce electricity consumption and emissions from the State Road Network by 50 % by 2030. Thus, it is planned to invent/r EUR 457 million in boosting energy/ca efficiency and reducing dependence on fossil Combus/ables with the introduction of more modern systems and the sustainable transformation of the vehicle fleet. This Strategy is one of the milestones included in component 6 – sustainable, safe and connected mobility – of the Addendum to the Recovery Plan to improve the energy efficiency of transport infrastructure.	
State Road Network Energy Efficiency Strategy 9ca 2030	The Energy Efficiency Strategy/ca/aims to modernise the road lighting system, both in tunnels and in the open sky, from high pressure sodium vapour luminaires (VSAP) to LED lighting, and to introduce intelligent lighting ges/on lighting systems that allow it to be regulated with the presence of vehicles and persons, or according to clima/c parameters. A new consumption system will also be put in place and focus on the gradual renewal of the own fleet of vehicles, as well as sustainability measures for companies providing services for the maintenance and operation of the road network.	It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector
Indicative Strategy9va for the development, maintenance and renewal of railway infrastructure	The Indica Strategy for the development, maintenance and renewal of railway infrastructure is set out in Law 38/2015 on the railway sector. Your focus is to establish a set of basic guidelines for the future mobility needs and financial sustainability of the rail system. The Strategy analyses the current planning and those of the bordering countries, includes a diagnosis of the rail network that serves as the basis for the formulation of the strategic waffles/beds, and sets out the action programmes that serve to define the two alternative/vios scenarios envisaged. Opting for the second scenario, the investment priorities are reoriented towards actions related to co-mobility, freight transport and maintenance of the existing network, as they contribute to improving citizen/target mobility and respond to the transport system's challenges in terms of safety, quality, efficiency and environmental and financial sustainability. It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector	

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Goods 30	In implementation of the Sixth Additional Provision (Rail Transport) of Law 7/2021 on climate change and energy transition, and Axis 6 of the Secure, Sustainable and Connected Mobility Strategy, it initiates/will boost rail freight transport as the backbone of logistics/mul/modal chains. Its scope is the railway network on which traffic of goods, mainly the General Interest Rail Network and private loaders. To this end, actions and measures are implemented in the short and medium term, the introduction of which would increase the modal share of rail freight from the current 4 % to 10 % in 2030, reducing the net/vas externalities of transport. The cost is/Mado of the proposed actions exceeds EUR 8.400 million in the current decade.	Has synergies on aspects related to decarbonisation in the transport sector
Master Plan for Combating Climate Change 9co 2018-2030 of RENFE, Adif and Adif-AV	The Master Plan stems from the Framework Agreement for the fight against climate change between Renfe, Adif and Adif Alta Velocidad as a contribution to the obje/vo of the Paris Agreement. Its strategic lines are: GES/on energy, energy efficiency/ca, decarbonisation y culture from awareness; covering twenty measures and 76 projects. Energy efficiency/decarbonisation measures result in a cumulative reduction of 5.200 GWh and a reduction in emissions of 1.5 Mt CO2 in the transport sector, amounting to 9.9 Mt CO2 taking into account the modal shift towards rail.	It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector
Plan to combat climate change 9co 2018-2030 for Adif and Adif-AV	As a result of the previous Master Plan, Adif and Adif Alta Velocidad have defined their own Plan by supplementing it with measures to adapt to climate change. The Plan/ene as a means of increasing the contribution of both companies, and of the rail system as part of the transport sector, in combating the causes and effects of climate change. To this end, the Plan is structured into five lines of action – energy, energy efficiency, decarbonisation and renewable energy, improving the resilience of railway infrastructure, and culture and awareness-raising – which include seventeen programmes and 56 projects for the achievement of their work: reduce energy consumption and GHG emissions, improve the resilience of rail infrastructure and increase the awareness of interest groups in the face of climate change.	It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Airport Regulation Document 2022-2026	The Airport Regulation Document (DORA) is the instrument that defines the minimum conditions necessary to ensure the accessibility, sufficiency and adequacy of airport infrastructure and the adequate provision of airport services. Among the strategic investments to be undertaken by Aena are those related to the decarbonisation of Aena's ac/vision, developing indicators and track (s) to be deployed to minimise emissions from aircraft operations in/on.	Has synergies on aspects related to decarbonisation in the transport sector
Action Plan for the reduction of $CO2_{emissions}$ from aviation	Developed within the framework of the International Civil Aviation Organisation, the Plan summarises the actions to be taken by aviation actors and authorities to reduce $CO2_{emissions}$ from aviation. These actions are framed by the fifth holistic approach – promoted in Resolution A40 18 – of: (I) emission reduction at source; (II) development of technologies for emission reduction; (III) deployment of sustainable aviation Combus/bles and operational improvements; (IV) improvement of the Gges/On Air Traffic; and (iv) implementation of market-based measures.	Has synergies on aspects related to decarbonisation in the transport sector
Aena Sustainability Strategy and its Climate Action Plan 2021-2030	This Strategy and its Plan/aim to achieve more sustainable air transport have set out four strands of work: carbon neutrality, sustainable aviation, responsible resource use, and sustainable community and value chain. The following are among the focal points in relation to decarbonisation: • Maintaining the purchase of energy 100 % electricity with renewable energy. • Get in 2 026 in a carbon neutral operator and laying the foundations for reaching zero emissions by 2040. • Expansion of LED technology 100 % at terminals in 2026 and apron and bending deployment in 2030. • Conduct pilot tests for the use of hydrogen cells in generating sets.	It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector

Planning instrument	Objects and/or requirements of the planning instrument with the objectives of the instrument in which it can interact with the NECP	Significant interactions of the NECP planning
Enaire sustainability strategy	Known as 'Green Sky', covers two initials/vas targeting a the decarbonisation: • The first – 'Clean flight' — the efficiency of flights is improved by reducing the distance flown by flexible use of airspace, coordinated with the Ministry of Defence, through the implementation of the 'free route', cruise levels or levels and climb and descent procedures. It brings synergies in aspects going back to/with zero. decarbonisation and efficiency gains • The second — Eco-Enaire- energy/ca in the transport sector improving the environmental gauges of workplaces at par/r of their energy/cas audits, op/by measuring lighting consumption, installing charging points for electric vehicles and decarbonising the vehicle fleet. In addition, all air control centres and main air navigation facilities will be provided with renewable energy for self-consumption.	
Strategic framework of the port system of general interest	The Strategic Framework – set out in Article 52 of Royal Decree Legisla/vo 2/2011 – for the 2030 horizon,/aims to reformulate the course of ports and address areas such as the clima/ca emergency, the digital transformation or the emergence of the economy 4.0. This Strategic Framework has 16 strategic lines with its broad umbrella (s) of ges/on, the results of which are delivered through specific targets built on measurable indicators. These are: • Line strategic 3: demand-driven, reliable, connected and sustainable infrastructure. o Obje/General de ges/ón 3.3: reliable and resilient infrastructure. Obje/General de ges/ón 3.4: infrastructures connected e o Obje/General de ges/ón 3.5: environmentally friendly infrastructure. • Strategic line 10: ports environmentally sustainable. • Strategic line 11: ports eco-proac/vos. o Obje/General de ges/ón 11.1: eco-sustainable mobility is in place. o Obje/General de ges/ón 11.2: contribute to my/her clima/co change. These measures are integrated and implemented through the State Ports Sustainability Strategy.	Has synergies in aspects related to the or decarbonisation and efficiency gains energy in the interoperable transport sector.

Objectives or requirements of the planning instrument	Significant Interactions of the instrument with the objectives of the PNIEC	Interactions of the PNIEC planning instrument from which the NECP may interact
Sustainability Strategy and State Ports Agenda 2030	The strategy's focus is to avoid that the increase in demand for Mari/mo transport is accompanied by an equivalent increase in the impacts that transport infrastructure and services have on its surroundings. The Strategy is built around 12 lines of action, including: - Encouraging the development of Motorways of the Sea. - Boosting rail transport from and from/to ports. - Improved mobility of heavy-duty vehicles in the port environment. - Promotion of alternating/transient energy in transport. - Improving energy efficiency and boosting the use of renewable energy.	It presents synergies in aspects related to decarbonisation and improved energy efficiency in the transport sector
Strategy for the promotion of Vehicle with Alterna9vas	It analyses the pair/cularities of each of the alternating technologies/vans to conventional Combus/Cables (petrol and diesel) and proposes concrete actions structured into 30 measures covering three strands of action: - Industrialisation: The industrialisation of alternating/floating vehicles and associated supply points is encouraged - Market: Actions to boost demand are defined to achieve a sufficient market. - Infrastructure: To promote a network of infrastructure enabling users' mobility needs to be met and thus to enable the development of a Combus market/alternating bles/vo	The NECP with/includes specific measures related to the transport sector that address the modal shift towards low-emission or non-emitting modes of mobility, efficient use of means of transport, the renewal of the car fleet and the promotion of electric vehicles, enabling greater penetration of renewable energy in the sector. These measures are detailed in the energy efficiency dimension and there is a specific measure in relation to the strategy: - Measure 2.5. Promotion of electric vehicles On the other hand, the decarbonisation dimension incorporates a measure to support advanced biocombus/bles: - Measure 1.12. Biofuels and other renewable Combus/ables in transport.
National Action Framework for Alterna9vas energy in	Approved by the Council of Ministers in 2016, this Framework of Action/aims to promote the use of alternating energies in transport under a technologically neutral approach.	The NECP with/includes specific measures related to the transport sector that address the modal shift towards low-emission or non-emitting modes of mobility, efficient use of means of transport, the renewal of the car fleet and the promotion of electric vehicles, enabling greater penetration of renewable energy in the sector. These measures are detailed in the energy efficiency dimension and there is a specific measure in relation to the strategy: - Measure 2.5. Promotion of electric vehicles On the other hand, the decarbonisation dimension incorporates a measure to support advanced biocombus/bles: - Measure 1.12. Biofuels and other renewable Combus/ables in transport.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Master Plan for Combating Climate Change 9co (2018-2030) ADIF	The Plan, developed by RENFE and ADIF, focuses on reducing emissions and energy-saving by promoting modal shift to rail, boosting the decarbonisation and energy efficiency of the rail system, and increasing the use of renewable energy, with measures such as the purchase of green energy. The plan aims to enhance and exploit the environmental benefits of rail compared with other modes of transport in terms of air emissions.	The Plan is limited to the General Interest Rail Network (RFIG), where 98 % of the energy in the rail sector in Spain is consumed. The plan shows, in line with the NECP, that rail is the least energy-intensive mode of transport. The external costs of rail are much lower than those of other modes, such as road and air transport (the externalities of which are between 3 and 5 times those of the former). For CO_2 emissions, emissions from the road are 5 to 7 times those from rail and air transport from 7 to 10 times. ADIF's COLACA/co master plan for combating climate change covers modal shift, energy efficiency and decarbonisation, all of which are included in the NECP, for which it can be said that they are aligned.
Air Navigation Plan 20172020 (Updated 2021)	The Single European*Sky project*of the European Commission makes airspace an increasingly global and competitive environment. It is essential to remove the current fragmentation of air spaces and national systems in order to achieve a homogeneous European space, with interoperable technological systems. In that case, ENAIRE (in/national public authority providing air traffic services) and its strategic plan called 'Flight Plan 2020', is responsible for modernising and developing the Spanish air navigation system. Improving airspace capacity and efficiency is one of the priorities of this plan. In 2021, the strategic plan was updated to the title 'Flight Plan 2025', which with/will support the process of modernising and transforming ENAIRE, for cons/TUIR as an essential tool for both the crisis resulting from the COVID-19 pandemic and for addressing the deep structural changes in the sector.	The NECP interacts closely with the environmental commitments of the navy/navy navigation plan to strengthen emission reductions in relation to transport efficiency. The Navigation Plan incorporates as environmental benefits the improvement of route efficiency (more direct route design) and the implementation of green approaches to airports, in order to reduce GHG emissions at least 185.000 Tonnes of CO_2 to 2025, reduce flight distances (improved routes) and save Combus/ble. Aspects that are aligned with the NECP, in the dimension of energy efficiency/ca in transport.

Long-term Strategy for Energy Rehabilitation 9 in the Building Sector in Spain (ERESEE 2014, updated 2017 and 2020)

The 2014 ERESEE strategy provided the focal point for boosting energy/ca renovation in the building sector in Spain, as well as a roadmap that is still in force and provides a guide for the various actors involved in the renovation processes.

The update carried out in 2017, which meets the requirements of Article 4 of Direc/va 2012/27/EU on Energy Efficiency, includes: an analysis of the evolution of energy consumption in the building sector and the evolution of renovation in Spain; the follow-up of the measures to boost energy rehabilitation implemented; an analysis of the main structural challenges; and a proposal for new short-, medium- and long-term measures to boost renovation and energy efficiency in the building sector.

Furthermore, in order to comply with Article 2a of Direc/va 2010/31/EU of 19 May 2010 on energy efficiency of buildings, as amended by Direc/va (EU) 2018/844, the ERESEE was updated in 2020. This update has been assessed by the BPIE Buildings Performance Ins/tute Europe as the best of the national strategies presented to the EU under the mandate of Direc/va 2010/31/EU.

The NECP includes a number of specific measures to improve energy efficiency in buildings. These measures are consistent with the long-term strategy for energy renovation in the building sector in Spain, as well as with the Housing Plan, which is the basic tool for promoting urban and rural regeneration and renewal.

The measures in the NECP related to the energy/ca renovation of the building are:

- Measure 2.8. Energy efficiency/ca in existing buildings in the residential sector.
- Measure 2.13. Energy efficiency/ca in cold generating equipment and large climate/tertiary sector installations and public infrastructure.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
State Housing Plan 20182021	The State Housing Plan is one of the following: - Persis/r in adapting the support system to current social needs and limited resources available. - Help mortgage debtors to meet the obligations of their mortgage loans. - Strengthen inter-administrative/va cooperation and coordination, - Improving building quality (conservation, energy/ca efficiency, universal accessibility and environmental sustainability) - Contribute to the increase of the fleet of dwelling rented or transferred in use. - Make it easier for young people to have access to decent and adequate rented housing. - Help prevent the depopulation of small municipalities. - Facilitate the enjoyment of decent and adequate housing for older people and persons with disabilities. This Plan is currently in force, as it is extended until 2023, in accordance with Royal Decree 42/2022 of 18 January.	The NECP proposes actions in the field of energy renovation of buildings: improving energy/efficiency (thermal envelope) and improving energy/ca efficiency (renovation of thermal heating installations and DHW). There are also measures to combat energy poverty. - Measure 1.8. Development of self-consumption with renewables and distributed generation. - Measure 2.9. Renewal of the residential equipment. Measure 4.2. Fight against energy poverty/ca.

12. Circular economy: consumption of resources and waste water

Instrument for planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP and the
State Programme of Prevention of Waste 2014-2020	The State Waste Prevention Programme 2014-2020 develops waste prevention pollen by reducing the generation, reu/lifespan and elongation of the product's life, reducing the content of harmful substances in materials and products, and reducing the adverse impacts on human health and the environment of the waste generated. For each waste group, the Plan sets out a series of wafer (s) and quota (s) focused on recovery, reu/lission, recycling, energy recovery/ca and, at the same instance, the ver/do, as well as the per/nente measures to achieve them and the monitoring indicators. It also provides for the reduction of ver/two biodegradable waste, through recovery, recycling, composting and biomethanisation.	The NECP foresees a reduction of GHG emissions in the waste sector at 2030 levels by 1990. The following measures provided for in the NECP incorporate, to a greater or lesser degree, the gauges of waste: - Measure 1.15. Development of biogas and biomethane. - Measure 1.16. Development of renewable hydrogen. - Measure 1.21. Specific programmes for biomass harvesting. - Measure 1.32. GHG emission reduction in the agriculture and livestock sectors - Measure 1.33. Reduction of GHG emissions in waste gauges/on - Measure 1.35. Forest sinks
2016-2022 national Waste Framework Plan (PEMAR)	The end of the National Waste Framework Plan, as well as the EU waste poli/ca, is Conver/r to Spain in a resource efficient society, moving towards a circular economy. In other words, your/his/her/UP a linear economy based on producing, consuming and/or producing, by a circular economy in which the materials from which the waste is/are produced for the production of new products or raw materials are reincorporated into the process	The NECP foresees a reduction of GHG emissions in the waste sector at 2030 levels by 1990. The following measures provided for in the NECP incorporate, to a greater or lesser degree, the gauges of waste: - Measure 1.15. Development of biogas and biomethane - Measure 1.21. Specific programmes for biomass harvesting. - Measure 1.32. Reduction of GHG emissions in the agriculture and livestock sectors. - Measure 1.33. Reduction of GHG emissions in waste gauges/on. - Measure 1.35. Forest sinks
7th general Radiac9Live Waste Plan (GRWP)	The General Radiac/Live Waste Plan (GRWP) is the document setting out the strategies and vities to be implemented in Spain in relation to radiac/vo waste, the dismantling of nuclear installations and their economic-financial study. It is approved by the Council of Ministers and regularly reviewed and updated. The 7th GRWP, approved by the Government on 27 December 2023, makes the -2030 National Energy and Climate Plan 2023- (NECP), which provides for the orderly closure of Spanish nuclear power plants over the 2027-2035 period, the reference scenario.	The NECP, when developing the measures that may involve the closure and decommissioning of nuclear power plants, must comply with the provisions of the Plan, which is why there is an interrelationship between the two plans around this measure. The NECP also sets out the improvement brought about by the shift to renewable energies in relation to the water-intensive consumption of nuclear power plants, according to the decarbonisation dimension measures and the design of an energy

Instrument for planning	Objects and/or requirements of the planning instrument with which can interact the NECP	Significant interactions between the NECP and the
Spanish Circular Economy Strategy, Spain Circular 2030 (EEEC)	The EEEC lays the foundations for a new production and consumption model where the value of products, materials and resources are maintained in the economy for as much/as possible, where waste generation is minimised and unavoided waste is used as widely as possible. The Strategy thus contributes to Spain's efforts to achieve a sustainable, decarbonised, resource-efficient and competitive economy. Glue/turkeys at 2030: - Reduce national material consumption by 30 % in relation to GDP, taking 2010 as the reference year. - Reduce waste generation by 15 % compared to 2010. - Reducing food waste generation across the food chain: 50 % reduction per capita at household and retail level and 20 % in production and supply chains at par/r level in 2020. - Increase the kneading/lifespan and preparation for re-uplift to 10 % of the municipal waste generated. - Improve water efficiency by 10 %. - Reduce greenhouse gas emissions below 10 million tonnes of CO2 equivalent.	The signatories of the Pact for a Circular Economy, signed in order to involve Spain's main economic and social players in the transition to this economic model, commit themselves to a series of actions, which are aligned with the NECP. These are: - Progress in reducing the use of non-renewable natural resources - Promote patterns that increase innovation and overall process efficiency These two actions are perfectly aligned with the dimensions of decarbonisation of the economy and energy efficiency addressed in the NECP. Highlighted measures would be: - Measure 1.15. Development of biogas and biomethane - Measure 1.33. Reduction of GHG emissions in waste gauges/on

In addition to the instruments indicated above, the following may also be highlighted because of their relevance:

- State Inspection Plan for Cross-Border Shipments of Waste 20212026 (PEITTR)
- Spain's National Comprehensive Waste Plan (PNIR)

13. Population, public health and material goods

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
National Strategy for Civil Protection	It develops an analysis of the main threats and risks of natural, human and technological origin that may lead to emergencies or disasters in Spain, as well as the strategic lines of action to integrate, prioritise and coordinate efforts that make it possible for op/measure the resources available for its ges/on.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. It is in line with the National Civil Protection Strategy.
State Civil Protection Plan for Forest Fire Emergencies	The State Plan/aims to establish the organisation and procedures for action to ensure an effective response from all public administrations in cases of forest fire emergencies where the national interest is present, as well as, in other cases, to provide the necessary support to the Autonomous Communities' plans when they require it. Furthermore, the State Plan facilitates collaboration between the Autonomous Communities' plans, establishing the mechanisms that make it possible to provide resources and resources from one to another in a coordinated manner.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Their obje/vos and measures are in line with the State Civil Protection Plan for Forest Fire Emergencies. In this case, Measure 1.35. Forest sinks, including concrete actions such as a4. Implementation of forestry work for forest fire prevention and a5. Controlled grazing in strategic areas for forest fire prevention
State Plan for Civil Protection before the Seismic risk	The way in which the State Plan is drawn up is to establish the organisation and procedures for action of those State services and, where appropriate, others in public and private sectors, which are necessary to ensure an effective response to the various seismic situations that may affect the country.	The NECP does not present any measures or actions that directly affect the seismic risk targeted by the National Civil Protection Plan.
State Civil Protection Plan to the Volcanic risk	The way in which the National Plan is drawn up is to establish the organisation and procedures for action to ensure an effective response from all public administrations in the event of an emergency due to volcanic risk in which the national interest is present, and, in other cases, to provide the necessary support for the Civil Protection Plan of the Autonomous Community of the Canary Islands or any other affected party.	The NECP does not present any measures or actions that directly affect the wafer (s) pursued by the State Civil Protection Plan in the face of the Volcanic Risk.
State Plan for Civil Protection against Flood Risk	The work of the State Plan is to establish the organisation and procedures for action of those services of the State and, where appropriate, of others in public and private sectors, which are necessary to ensure an effective response to the various floods that may affect Spain. The State Plan for Civil Protection against Floods operates/strongly based on the Special Civil Protection Plans against this risk or, failing that, in the territories of the Autonomous Communities concerned.	The NECP is a planning instrument that responds to the commitments made by Spain in response to the challenge of climate change. Their obje/vos and measures are in line with the State Civil Protection Plan in view of the risk of flooding. In this case, Measure 1.35. Forest sinks include concrete actions such as a.2. Promotion of ponds and native species in their/tution of agricultural cul/roves in floodable areas and a.7. Hydrological – forest restoration in areas at high risk of erosion

Instrument for planning	Objects or requirements of the instrument planning with which you can interacting the NECP Significant interactions between the	NECP and the Objectives of the instrument of planning
	The purpose of the State Plan/is to establish the organisation and procedures for the operation of those resources and services of the State and, where appropriate, of others in public and private sectors, which are necessary to ensure an effective response from all public administrations to the various radiological emergency situations, with an impact on the population, in which the national interest is present, as well as the mechanisms for supporting Autonomous Communities' plans in cases where this is required.	
State Plan for Civil Protection against Radiological Risk		The NECP does not present any measures or actions that directly affect the wafer (s) pursued by the State Civil Protection Plan against Radiological Risk.
State Plan for Civil Protection against the Risk of Maremotos	The purpose of the State Plan/is to establish the organisation and procedures for the operation of those resources and services of the State and, where appropriate, others in public and private sectors, which are necessary to ensure an effective response from all public administrations to the various emergency situations in the event of a possible occurrence of a tsunami on any part of the Spanish coasts, where the national interest is present, as well as the mechanisms for supporting the plans of the Autonomous Communities in the cases that require it.	The NECP does not present any measures or actions that directly affect the waffles/beds pursued by the State Civil Protection Plan against the risk of Maremotos.
General State Plan for Civil Protection Emergencies (PLEGEM)	The purpose of the State Plan/is to establish the organisation and procedures for the operation of those resources and services of the State and, where appropriate, others in public and private sectors, which are necessary to ensure an effective response from all public administrations, to the various civil protection emergencies, especially those of a non-specific nature and of a mule/risk nature, and to crises of all/po, including those with a low probability of occurrence, but of very high impact, and to which the ordinary plans do not provide an adequate response, in which the national interest is present, as well as the mechanisms for supporting Autonomous Community plans in the cases that require it.	The NECP does not present any measures or actions that directly affect the work/tools pursued by the General State Plan for Civil Protection Emergencies.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
State Plan for Civil Protection against Chemical Risk	The purpose of the State Plan/is to establish the organisation and procedures for the operation of those resources and services of the State and, where appropriate, others in public and private sectors, which are necessary to ensure an effective response from all public administrations to the various emergency situations resulting from accidents involving dangerous substances, in which the national interest is present, as well as the mechanisms to support Autonomous Communities' plans in cases where this is required. This Plan/is a Master Plan, in so far as it sets out the general, organisational and functional aspects of the planning to be specified in the planning (s) (coordination and support plans) and in specific procedures for action. It covers major accidents involving chemical substances in the form of fires, explosions or containment losses, where the national interest is present.	The NECP does not present any measures or actions that directly affect the work/tools pursued by the General State Plan for Civil Protection Emergencies.
Strategic Plan for Health and the Environment 2022-2026	A comprehensive plan setting out the actions to be taken to reduce the health impact of the main environmental factors and their determinants. Its main focus is to promote environmental environments that improve the health of the population and reduce the risks associated with exposure to environmental factors, as well as address the unawnings of climate change. Its implementation is part of the public health strategy provided for in the Public Health Act (33/2011), Article 43 of the Cons/tution and international commitments (SDG, Agenda 2030, EU, WHO, etc.) on environmental health.	The NECP is fully aligned with the Plan, as its key focus is to reduce GHG emissions, contributing to my/her climate/co change and also to improving air quality.

Planning instrument	Objectives or requirements of the planning instrument with which the NECP may interact	Significant interactions between the NECP and the objectives of the planning instrument
Spanish Strategy for Safety and Health at Work 2023-2027	Its glue/vo 02: "Managing the RIGHTED CAMBLES OF NEW WORK ORGANISATION FORMS, THE DEMOGRAPHICAL EVOLUTION AND THE CLIMATIVE CAMBIO DESDING THE PREVENTIVE OUTTURE" shows that the future of work is marked by the confluence of various economic, environmental and social factors and trends, which are leading to changes in the business fabric, in employment relations and in the organisation of work, as well as in the risks to which the working population is exposed. The interdependence of these factors means that public pollen needs to be aligned to address them from a holistic approach and to seek solutions that put people's health before any other priority. In order to achieve this wrap-up, action line 2.1 'Strengthening inventions in order to know and get out of the disawls that the transformation of the world of work entails in relation to the prevention of occupational risks' proposes that inventions/projects should be obased/focused on understanding the fears (s) such as: climate change, safety and health of workers in green and waste jobs.	The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Their obje/vos and measures are in line with the Spanish Strategy on Safety and Health at Work.
National Cybersecurity Strategy	This strategy has enhanced and strengthened public-private partnerships with the various energy operators, which has been coordinated by the Coordination and Cybersecurity Office (OCC) of the Ministry of the Interior. In addition, the revisions of 13 Operator Security Plans (PSO) have been approved, checking that they are in line with the current situation of threats and disagreements faced by some of the critical infrastructures in the energy sector and the nuclear industry, updating the information contained in these plans.	The achievement of the workings/roofs of the Plan is conditional on the proper functioning of the cybersecurity mechanisms. At the same time/link the dimensions of the Energy Security/ca and Decarbonisation Plan. The NECP interacts closely with cybersecurity commitments by promoting cybersecurity measures for both energy networks (in pair/grids), as well as data transfer, in pair/cular of consumers, as indicated by Measure 3.9 in the internal energy market dimension.

14. Investing Aging and Innovation

Instrument for planning	Objects and/or requirements of the planning instrument with which can interact the NECP	NECP and the objections to the planning instrument
	Significant interactions between the	

Spanish Strategy for Science, Technology and Innovation (EECTI 2021-2027)	EECTI is the multiannual reference framework for the promotion of scientific, technical and innovation inventions, which sets out the compact waffles/loops by all public administrations. In particular, EECTI 2021-2027 aims to put science, technology and innovation as key axes in achieving the Sustainable Development Goals of the 2030 Agenda, contributing to the European Union's political priorities by aligning with its R & D & I programmes and responding to the challenges of national strategic sectors through R & D & I, to the benefit of our country's social, economic, industrial and environmental development. The Spanish Strategy for Science, Technology and Innovation (EECTI) is developed within the scope of the General State Administration through the multiannual State Plan for Science, Technology and Innovation (PEICTI), which sets out its scientific, technical and social priorities. In particular, for EECTI 2021-2027, two State plans have been developed, the 2021-2023 PEICTI and the recently published PEICTI 2024-2027.
State Plan for Investing 9Cienlfica, Technical and Innovation (PEICTI 2024-2027)	The PEICTI develops the strategic lines defined in the Strategy and sets out the priority areas of intervention that cons/protect the national smart specialisation areas. In relation to the area of energy and mobility, the 2024-2027 EIPTI incorporates as strategic lines the Energy Transition/Decarbonisation, Smart and Sustainable Mobility, Smart and Sustainable Cities and Ecosystems and the Just and Inclusive Energy Transition. EECTI 2021-2027 defines a number of strategic lines in priority sectors and major tractor projects, including the strategic area of Climate, Energy and Mobility. Strategic actions in this area focus on the following sectors: - Climate change/co and decarbonisation - Sustainable mobility - Sustainable cities and ecosystems The NECP, through the measures adopted in its inventions, innovation and competitiveness dimensions, in line with the obje (s) and principles set out in EECTI, will help to provide a comprehensive and systemic response to adequately achieve the glue (s) marked in the invading/vignette and innovation dimension throughout the energy and climate value chain. In the 2024-2027 PEICTI, the promotion of the strategic lines and their priority intervention areas is set out as one of the cross-cutting programmes, which will be implemented through specific actions falling within the programmes for Human Resources, inventions/development, transfer and collaboration, innovation and R & D & I infrastructure. These actions include dis/NTAS funding arrangements and instruments both by the MICIU and by other ministerial departments and their compliance with the funding bodies. At the same time, in the 2024-2027 PEICTI, the strategic lines and their priority areas of intervention have been updated taking into account the PERTE, the Important Projects of Common European Interest (IPCEI) in which Spain is linked/CIPA, as well as a series of sectoral strategies and plans aimed at promoting inventions/vities, development and innovation in their respect for their respective areas of competence. In parallel, actions in the EA on energy and mobility will be aligned with the measures set out in the NECP, as well as the Long-Term Decarbonisation Strategy (EDPL) 2050, the National Plan for Adaptation to Climá/co Change (PNACC 2021-2030), the Just Transition Strategy, the Safe, Sustainable and Connected Mobility Strategy 2030, the Spanish Urban Agenda, and other strategies. plans and roadmaps linked to the energy transition such as the Energé/co Storage Strategy, the Hydrogen Roadmap, the Roadmap for the Development of Marine Wind and Marine Energy in Spain and the Biogas Roadmap. Similarly, the actions of the PEICTI are aligned with those aimed at R & D & I in the PERTE and in pair/cular, in the PERTE for renewable energy, renewable hydrogen and storage, the PERTE VEC, the PERTE aerospace, the PERTE of the shipbuilding industry, the PERTE for industrial decarbonisation and the PERTE for the Circular Economy.

ANNEX I. PROGRESS IN THE DEVELOPMENT OF MEASURES

The following table shows the progress made in the development of the measures designed in the 2021-2030 NECP. Progress was made from 1 to 4, with 4 being the most advanced. On the contrary, 1 would indicate an emerging state in the implementation of the measure. Intermediate values would apply to cases where mechanisms have already been put in place to implement the measure both at regulatory and objective-level, but we do not consider that the proposed targets have been fully achieved.

Table I.1. Progress in compliance with the measures of the NECP 2021-30

3.1 DECARBONISATION DIMENSION		
	MEASURE	STATE
Measure 1.1.	Development of new electricity-generating installations using renewable energy	3
Measure 1.2.	Demand management, storage and flexibility	3
Measure 1.3.	Adaptation of electricity grids for the integration of renewables	3
Measure 1.4.	Development of self-consumption with renewables and distributed generation	3
Measure 1.5.	Incorporation of renewables in the industrial sector	2
Measure 1.6.	Framework for the development of renewable thermal energy	3
Measure 1.7.	Advanced biofuels in transport	3
Measure 1.8.	Promotion of renewable gases	3
Measure 1.9.	Technological renovation plan for existing renewable power generation projects	2
Measure 1.10.	Promotion of bilateral renewable electricity procurement	2
Measure 1.11.	Specific programmes for biomass harvesting	1
Measure 1.12.	Unique projects and strategy for sustainable energy on islands	3
Measure 1.13.	Local energy communities	3
Measure 1.14.	Promoting the proactive role of citizens in decarbonisation	3
Measure 1.15.	Fair transition strategy	3
Measure 1.16.	Public procurement of renewable energy	2
Measure 1.17.	Training of professionals in the renewable energy sector	2
Measure 1.18.	Review and simplification of administrative procedures	2
Measure 1.19.	Knowledge generation, dissemination and awareness raising	2
Measure 1.20.	European Emissions Trading System	2
Measure 1.21.	GHG emission reduction in the agriculture and livestock sectors	2
Measure 1.22.	Reduction of GHG emissions in waste management	2

Measure 1.23.	Reduction of GHG emissions related to F-gases	2
Measure 1.24.	Forest sinks	2
Measure 1.25.	Agricultural sinks	2
Measure 1.26.	Taxation	1

3.2 ENERGY EFFICIENCY DIMENSION

	MEASURE	STATE
Measure 2.1.	Low emission zones and modal shift measures	3
Measure 2.2.	More efficient use of means of transport	3
Measure 2.3.	Renewal of the motor vehicle fleet	2
Measure 2.4.	Promotion of electric vehicles	3
Measure 2.5.	Improvements in technology and industrial process management systems	2
Measure 2.6.	Energy efficiency in existing buildings in the residential sector	3
Measure 2.7.	Renewal of residential equipment	3
Measure 2.8.	Energy efficiency in buildings in the tertiary sector.	3
Measure 2.9.	Energy efficiency in cold generating equipment and large air-conditioning installations in the tertiary sector and public infrastructure	3
Measure 2.10.	Energy efficiency in farms, irrigation communities and agricultural machinery	1
Measure 2.11.	Promotion of energy services	2
Measure 2.12.	Public sector: accountability and energy efficient procurement	3
Measure 2.13.	Energy audits and management systems	2
Measure 2.14.	Training of professionals in the energy efficiency sector	2
Measure 2.15.	Communication and information in the energy efficiency sector	1
Measure 2.16.	Other measures to promote energy efficiency: The transition in high-efficiency cogeneration	2
Measure 2.17.	Financial measures: National Energy Efficiency Fund	2

3.3 ENERGY SECURITY DIMENSION

	MEASURE	STATE
Measure 3.1.	Maintenance of minimum safety stocks of petroleum products and gas	3
Measure 3.2.	Reducing dependence on oil and coal on islands	2
Measure 3.3.	Recharging points for alternative fuels	2
Measure 3.4.	Boosting regional cooperation	3
Measure 3.5.	Deepening contingency plans	3
Measure 3.6.	Planning for the safe operation of a decarbonised energy system	3

3.4 INTERNAL ENERGY MARKET DIMENSION

	MEASURE	STATE
Measure 4.1.	Increase of electricity interconnection with France	1
Measure 4.2.	Increase of electricity interconnection with Portugal	2
Measure 4.3.	Electricity transmission infrastructure other than Projects of Common Interest (PCIs)	3
Measure 4.4.	Electricity market integration	3
Measure 4.5.	Protection of electricity consumers and increased competition	3
Measure 4.6	Access to data	3
Measure 4.7.	Gas market integration	2
Measure 4.8.	Protection of gas consumers	3
Measure 4.9.	Improving the competitiveness of the gas retail sector	1
Measure 4.10.	Gas Demand Management Development Plan	1
Measure 4.11.	Fight against energy poverty	3

3.5 RESEARCH DIMENSION INNOVATION AND COMPETITIVENESS

	MEASURE	STATE
Measure 5.1.	Strategic Energy and Climate Action	3
Measure 5.2.	Implementation of the SET-Plan	3
Measure 5.3.	Network of Excellence in Energy and Climate	3
Measure 5.4.	Increase, coordination, improvement and efficient use of scientific and technological infrastructure and equipment in energy and climate	3
Measure 5.5.	Public Procurement of Green Innovation	2
Measure 5.6.	Strengthening Public Risk Capital for Energy and Climate Technology Transfer	3
Measure 5.7.	New instruments to support research and innovation in Energy and Climate	3
Measure 5.8.	Social Innovation for Climate	1
Measure 5.9.	Cutting red tape and administrative burdens to encourage the recruitment of research talent in climate and energy	2
Measure 5.10.	Relaunch of the City of Energy Foundation, CIUDEN	3
Measure 5.11.	Science, Technology and Innovation Information System for monitoring funding	3
Measure 5.12.	R & I & c for the adaptation of the Spanish energy system to climate change	2
Measure 5.13.	Unique long-term programmes on scientific and technological topics that are strategic in the area of energy and climate	2
Measure 5.14.	Increase Spanish participation in the funding programmes of the European research and innovation	2
Measure 5.15.	Support for the participation of Spanish research groups in international energy and climate fora	3
Measure 5.16.	Promoting Mission Innovation	4
Measure 5.17.	European Innovation Funding Mechanisms	3

Measure 5.18. International Cooperation;

TABLE OF FIGURES

TABLE INDEX