

DRAFT UPDATE OF THE PLAN  
INTEGRATED NATIONAL ENERGY AND CLIMATE  
2023-2030

**June 2023. 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.**

BORRADOR

## TABLE OF CONTENTS

PRESENTACIÓN .....	5
1. SÍNTESIS Y PROCESO DE ELABORACIÓN .....	26
1.1. RESUMEN EJECUTIVO .....	26
1.2. PANORAMA DE LA SITUACIÓN ACTUAL.....	46
1.2.1. <i>Energía y Clima en la Unión Europea</i> .....	47
1.2.2. <i>Principales cambios normativos desde la elaboración del PNIEC en vigor</i> .....	48
1.2.3. <i>Políticas y medidas actuales en materia de energía y clima relativas a las cinco dimensiones de la Unión de la Energía</i> .....	49
2. OBJETIVOS GENERALES Y ESPECÍFICOS .....	65
2.1. DIMENSIÓN DE LA DESCARBONIZACIÓN .....	66
2.1.1. <i>Electrificación y descarbonización del sistema energético</i> .....	70
2.1.2. <i>Adaptación al cambio climático</i> .....	74
2.1.3. <i>De la generación a la gestión de la demanda y el almacenamiento</i> .....	76
2.1.4. <i>El papel de la ciudadanía en la transición energética</i> .....	77
2.2. DIMENSIÓN DE LA EFICIENCIA ENERGÉTICA .....	81
2.2.1. <i>Objetivo nacional de eficiencia energética a 2030</i> .....	81
2.2.2. <i>Objetivo acumulado de ahorro de energía final 2030</i> .....	83
2.2.3. <i>Estrategia Movilidad Sostenible 2030</i> .....	84
2.2.4. <i>Estrategia a largo plazo de renovación de edificios</i> .....	85
2.2.5. <i>Objetivo de eficiencia energética en los edificios públicos</i> .....	86
2.3. DIMENSIÓN DE LA SEGURIDAD ENERGÉTICA .....	88
2.4. DIMENSIÓN DEL MERCADO INTERIOR DE LA ENERGÍA .....	94
2.5. DIMENSIÓN DE INVESTIGACIÓN, INNOVACIÓN Y COMPETITIVIDAD .....	100
2.5.1. <i>Objetivos nacionales en I+D+I y objetivos nacionales de financiación</i> .....	100
2.5.2. <i>Objetivos específicos para tecnologías energéticas hipocarbónicas y limpias</i> .....	103
2.5.3. <i>Objetivos específicos en la ciencia del cambio climático</i> .....	108
2.5.4. <i>La competitividad de la economía</i> .....	109
3. POLÍTICAS Y MEDIDAS .....	111
3.1. DIMENSIÓN DE LA DESCARBONIZACIÓN .....	114
3.1.1. <i>Energías renovables</i> .....	114
3.1.2. <i>Sectores sujetos al comercio de derechos de emisión</i> .....	183
3.1.3. <i>Sectores difusos</i> .....	185
3.1.4. <i>Uso de la tierra, cambio de uso de la tierra y silvicultura (Reglamento 2018/841)</i> .....	198
3.1.5. <i>Fiscalidad</i> .....	205
3.2. DIMENSIÓN DE LA EFICIENCIA ENERGÉTICA .....	206
3.2.1. <i>Medidas para el cumplimiento de la obligación de ahorro de energía. Enfoque sectorial</i> .....	206
3.2.2. <i>Medidas horizontales relacionadas con la eficiencia energética</i> .....	262
3.2.3. <i>Eficiencia energética en las infraestructuras de gas y electricidad</i> .....	274
3.2.4. <i>Medidas financieras. FNEE</i> .....	274
3.2.5. <i>Sistema de Certificados de Ahorro Energético</i> .....	275
3.3. DIMENSIÓN DE LA SEGURIDAD ENERGÉTICA .....	277
3.4. DIMENSIÓN DEL MERCADO INTERIOR DE LA ENERGÍA .....	299
3.5. DIMENSIÓN DE INVESTIGACIÓN, INNOVACIÓN Y COMPETITIVIDAD .....	327
3.5.1. <i>Políticas y medidas para alcanzar los objetivos nacionales</i> .....	327
3.6. ASPECTOS TRANSVERSALES EN LA TRANSICIÓN ECOLÓGICA .....	363
3.6.1. <i>Integración de aspectos ambientales en el PNIEC</i> .....	363
3.6.2. <i>Perspectiva de género</i> .....	367
3.6.3. <i>Plan Nacional de Adaptación al Cambio Climático</i> .....	370
3.6.4. <i>Sinergias con otros planes</i> .....	381
3.6.5. <i>Interrelaciones entre las políticas y medidas</i> .....	413
4. ANÁLISIS DE IMPACTO DE LAS POLÍTICAS Y MEDIDAS .....	428
4.1. POLÍTICAS Y MEDIDAS .....	428
4.2. METODOLOGÍA .....	428

4.3.	INVERSIONES .....	429
4.4.	IMPACTOS SOCIOECONÓMICOS Y SALUD .....	431
4.4.1.	<i>Impactos sobre el PIB y el empleo</i> .....	431
4.4.2.	<i>Impactos en la salud</i> .....	436
4.5.	ANÁLISIS DE SENSIBILIDAD.....	438
4.6.	LIMITACIONES.....	440
4.7.	CONCLUSIONES.....	441
BIBLIOGRAFÍA 442		
ANEXO A. SITUACIÓN ACTUAL Y PROYECCIONES: ESCENARIO PNIEC 2023-2030 .....		443
ANEXO B. MODELOS .....		505
ANEXO C. PRINCIPALES ELEMENTOS DE LA LUCHA CONTRA EL CAMBIO CLIMÁTICO EN ESPAÑA .....		536
ANEXO D. INFORMES RED ELÉCTRICA DE ESPAÑA.....		543
ANEXO E. CONTRIBUCIÓN DEL PLAN A LOS OBJETIVOS DE DESARROLLO SOSTENIBLE DE LA AGENDA 2030 .....		562
ANEXO F. MEDIDAS Y METODOLOGÍA PARA APLICAR EL ART. 7 DE LA DIRECTIVA DE EFICIENCIA ENERGÉTICA .....		569
ANEXO G. PROCESO PARTICIPATIVO Y COMUNICATIVO .....		587
ANEXO H. INTERACCIONES CON OTROS PLANES Y PROGRAMAS .....		592
ANEXO I. AVANCE EN EL DESARROLLO DE MEDIDAS .....		629

## PRESENTATION

In line with European energy and climate policies, the Spanish Government has continued to develop in recent years the Strategic Framework for Energy and Climate, which contains a number of strategic and legislative elements aimed at identifying the main lines of action on the path towards climate neutrality and exploiting the social, economic and environmental opportunities of this process. As one of the key parts of this framework, the integrated National Energy and Climate Plan (NECP) is the first major strategic planning exercise and represents the full maturation of the energy and climate planning process in Spain.

At legislative level, within the same strategic framework, Law 7/2021 of 20 May 2021 on climate change and energy transition establishes the legal basis for ensuring Spain's compliance with the objectives of the Paris Agreement, facilitating the decarbonisation of the economy and promoting a sustainable development model. In particular, this Law elevates to the legislative level the international commitments made by Spain in its NECP, as well as the objective of achieving climate neutrality by 2050.

The Climate Change and Energy Transition Law includes as strategic planning instruments to address the energy transition the Integrated National Energy and Climate Plans and the Long-Term Decarbonisation Strategy 2050, consolidating in national legislation the energy planning tools included in Regulation (EU) 2018/1999 of 11 December on the Governance of the Energy Union and Climate Action. Thus, the NECP provides the guiding framework for the programme of investments and reforms for a just green transition that develops the strategic capacities of the green economy, and defines the measures that will enable the objectives set out in Law 7/2021 to be achieved, as well as the other sectoral objectives set out in this Plan, creating an appropriate framework to create stability and certainty.

In 2020, Spain published its first integrated National Energy and Climate Plan for the period 2021-2030, setting out Spain's climate and energy commitments for 2030. This document was assessed by the European Commission<sup>1</sup> which it gave a positive diagnosis of the document and its ambition. Other analyses prepared by other international bodies, as well as civil society entities and economic analysts have also<sup>2</sup> agreed on the ambition and clarity of the objectives and framework set by Spain.

Public participation was given a central role in the preparation of the 2021-2030 NECP. In addition, the preparation of a strategic environmental study was included, in accordance with the applicable legislation, Law 21/2013 of 9 December 2013 on environmental assessment. As a result of the process, the compatibility of renewable development with biodiversity and ecosystem conservation is ensured, ensuring their proper integration into the territories.

Since the adoption of the 2021-2030 NECP, numerous legislative proposals have been submitted and adopted at European level, increasing the level of ambition on climate change, and this has been reflected in the European Climate Law and the Fit for 55 and REPowerEU packages. As a result, the following targets have been agreed at European level at 2030<sup>3</sup>:

- 55 % reduction in greenhouse gas (GHG) emissions compared to 1990 for the EU as a whole.

---

<sup>1</sup> [https://energy.ec.europa.eu/system/files/2021-01/staff\\_working\\_document\\_assessment\\_necp\\_spain\\_es\\_0.pdf](https://energy.ec.europa.eu/system/files/2021-01/staff_working_document_assessment_necp_spain_es_0.pdf)

<sup>2</sup> 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.

<sup>3</sup> These legislative packages have not been adopted at the time of drafting this document, so that the objectives set out reflect the agreements resulting from the negotiation in the European institutions at the date of writing.

- 42.5 % renewables on total gross final energy consumption, with an additional indicative complement of 2.5 % that would reach 45 %.
- 38-40.5 % improvement in energy efficiency in final energy and primary energy respectively compared to baseline 2007.

2020 brought about an unprecedented global pandemic in modern times. In response to the resulting crisis, the European Union launched the EUR 750.000 billion *Next Generation EU* funds spread between 2021 and 2026, as a tool to relaunch the economy in a digital green key, also promoting social cohesion and equality, and putting the green transition as one of the main axes of the transformation of the economy. In Spain, these funds are being implemented through the Recovery, Transformation and Resilience Plan (PRTR).

More recently, the European Commission presented the REPowerEU Plan in response to global energy market disruptions caused by Russia's invasion of Ukraine. The Plan, adopted in May 2022, aims to diversify, save energy and accelerate the development of clean energy in order to speed up the reduction of the vulnerability of the European Union's external energy dependence. In this document, the Commission proposes to increase the current renewable energy targets for 2030 and stresses that energy savings are the "fastest and cheapest way to deal with the current energy crisis" and therefore proposes to increase the energy efficiency target, resulting in the objectives listed above.

These elements have largely constituted the context in which the process of updating the NECP was carried out: the increased climate ambition at European level, the most recent energy context, the progress in implementing the measures set out in the previous document, or the progress achieved thanks to the Recovery, Transformation and Resilience Plan, have been some of the key factors that have shaped this process.

Accordingly, this draft update of the 2023-2030 NECP has been drawn up, which includes objectives consistent with the emission reductions adopted at European level, and which will result in the following results in 2030:

- 32 % reduction in greenhouse gas emissions compared to 1990
- 48 % renewables on final energy use
- 44 % improvement in energy efficiency in terms of final energy
- 81 % renewable energy in electricity generation
- Reducing energy dependency to 51 %

## **1. Energy and climate change at the heart of the transformation of the production model**

The strategic nature of the NECP has facilitated anticipation and coherence of both sectoral policies and investment decisions, serving to **guide decision-making to short-term short-term scenarios in a manner consistent with structural challenges and opportunities in the medium and long term.**

The **strategic framework** developed around the NECP was set as objectives not only to ensure that Spain meets the **objectives of the Paris Agreement** and to facilitate the decarbonisation and **modernisation of the Spanish economy**, but also to create **jobs**, boost the competitiveness of the productive fabric, position 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**.

Thus, despite the changing context at global level, with specific characteristics for the European level, **the strategic framework developed has provided certainty and credibility which has**

**allowed 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.

**This credibility and the opportunity it is already presenting for the country are visible in various indicators and benchmarks.** Spain is the 8th most attractive renewable energy investor in the world according to the 61 edition of the *Renewable Energy Country Attractiveness Index (RECAI)*, prepared by Ernest -Young. It is also, after Germany, the 2th EU country that has concentrated the most investment in financing for new construction of assets for renewable energy projects in the period 2017-2021, according to Bloomberg Climatescope 2022, and the 7th globally.

In 2022 Spain was the<sup>3</sup> rd country receiving *greenfield* projects in the renewable energy sector and the 4th country that received the most projects involving R & D activities, as well as the 4th country in the ranking of countries receiving automotive or clean hydrogen projects, according to DataInVex<sup>4</sup>.

Spain accounts for around 20 % of the renewable hydrogen projects announced worldwide in 2022, after the United States alone. In addition, the European Commission has selected four Spanish projects in the IPCEI Hy2Tech technology wave *and seven in the industrial wave of IPCEI Hy2Use* from the Important Projects of Common European Interest ( *IPCEI HyUse*).

This outlook also translates into tangible results. Between 2019 and 2022, renewable installed capacity grew by 27.3 %, from 55.349 MW in 2019 to 70.452 MW in 2022, according to data from Red Eléctrica de España. The most increasing source of generation has been solar photovoltaic, which grew by 129.3 % in this period, from 8.747 MW to 20.054 MW. Wind power increased by 17.1 % in this time, from 25.678 MW in 2019 to 30.069 MW in 2022. Since 2019, renewable installed capacity exceeds that of conventional technologies.

In addition, wind and solar generation have increased by 40.3 %, with the latter playing a clear role, which grew by 201.6 % between 2019 and 2022. The growth in renewable capacity meant that in 2022 these sources covered 42 % of electricity demand, compared with 38 % in 2019. Red Eléctrica de España predicts that 2023 could be a historic year in which renewables account for **50 % of the generation mix, being the first country among the largest economies in Europe to achieve this**. These data are even more significant given that they do not include all self-consumption, which is to a large extent integrated on the demand side. This modality, which was set as one of the priorities in the original NECP, has grown by 1.200 % since 2018, from 0.4 GW to 5.2 GW, according to data from the sector, and has doubled its growth in the last year.

Against this background at international level, the ranking of IRENA in 2022<sup>5</sup> places Spain as the 2th EU country in wind capacity and 5 in the world, and the 8th country in the world's renewable installed capacity. Furthermore, according to the REE Electricity System Report 2022, Spain was the second European country in terms of installed renewable capacity and electricity generated by wind and solar power.

The employment impacts of this transformation are also very positive. In 2021, the renewable sector employed 111.409 people, 37 % more than in 2018 in Spain, according to the sector. In particular, the wind energy sector employed 32.087 people, 30 % more than in 2018, and employment in solar PV more than 4 times the 2018 levels.

---

<sup>4</sup><https://comercio.gob.es/InversionesExteriores/Estadisticas/Paginas/datainvex.aspx>

<sup>5</sup><https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Country-Rankings>

Beyond indicators specific to the energy sector, making energy cheaper with renewables is key to the competitiveness of the economy as a whole. The transformation has been reflected in the electricity futures markets and thus in the ever-improving investment prospects, which in Spain find forecasts of energy prices that are more affordable than in other European markets, precisely because of the prospect of renewable generation progressing.

The NECP also had a **socio-economic impact analysis**, which concluded that the NECP has significant positive effects on GDP, employment and public health, and also shows a **socially progressive effect**, i.e. with a greater positive impact on lower-income households. The progress and reinforced commitment contained in this update exercise increase this impact on the economy. Thus, as a result of the policies and measures of this updated NECP, GDP would increase by EUR 34.700 billion in 2030, implying a net employment increase of 522.000 jobs in 2030. This is compounded by co-benefits on health, as the improvements in air quality achieved achieve a significant reduction in premature deaths.

Boosting the energy transition and its benefits in terms of competitiveness, employment, health and the environment is also incorporating measures that aim at better territorial cohesion from the 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.

In short, the NECP allows Spain to aspire to be one of the leading countries of the European Union in the field of energy transition, as has been shown by the progress made so far. This is a transformation in which the Spanish economy has much to gain in terms of competitiveness, taking the form of prosperity, energy security, industrial job creation, innovation, technological development and the elimination of energy poverty.

**2. Since the adoption of the NECP, the Strategic Energy and Climate Framework has been completed by making progress in the implementation and deployment of the measures provided for in that Plan.**

Since the adoption of the NECP, the development and implementation of energy and climate policies have made it possible to complete the strategic framework with a number of key elements, which strengthen the comprehensive and coherent nature of all public policy in this framework:

In November 2020, the Government approved the **Long-Term Decarbonisation Strategy**, which sets out a path compatible with climate neutrality by 2050 and sets out multiple opportunities for job creation, improved quality of life and economic and industrial competitiveness. This scenario is based on available technology and knowledge that 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.

For its part, **Law 7/2021 of 20 May 2010 on climate change and energy transition** aims to ensure that Spain complies with the objectives of the Paris Agreement, to facilitate the decarbonisation of the Spanish economy and its transition to a circular model, so as to ensure the rational and solidarity-based use of resources; 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 of inequalities.



This standard provides a legal framework for the 2021-2030 NECP and the objectives contained therein and establishes the need for periodic review, if necessary only upwards, of these targets, with a first revision in 2023. It also develops legal 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<sup>6</sup>, which aims to anticipate and manage the consequences for those districts and people directly linked to technologies that will gradually be displaced as a result of the transition, in a spirit of equity and solidarity. The development of this strategy 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 the areas, support for entrepreneurs and support for projects that improve social and environmental services in areas that sometimes suffer from depopulation<sup>7</sup>. In the period since its approval, substantial progress has been made in implementing the 2021-2030 NECP. As of June 2023, the 78 measures provided for therein have been activated, of which 68 have an advanced stage of implementation. With the new NECP, new measures are introduced and previous ones reinforced in order to achieve more ambitious targets.

Some of the key measures and areas provided for in the current NECP have been developed in **strategic documents and sectoral roadmaps**, which have in turn expanded and clarified the identification of opportunities and actions to achieve the objectives around specific technologies or areas. Specifically, the following documents have been drawn up and approved:

- The Hydrogen Roadmap: a commitment to renovate hydrogen<sup>8</sup>
- The Energy Storage Strategy<sup>9</sup>
- The Autoconsumption Roadmap<sup>10</sup>
- The Roadmap for the Development of Marine Wind and Marine Energy in Spain<sup>11</sup>
- The Biogas Roadmap<sup>12</sup>
- The Roadmap for the Sustainable Management of Mineral Raw Materials<sup>13</sup>

These instruments **complement the design of the Strategic Energy and Climate Framework** and have, like the NECP, involved an intensive public participation process, through prior consultation, public hearings and information on specific drafts or working days, with the participation and input of specialised sectors, civil society and all stakeholders. This greater degree of detail, as well as the progress that has been made between the approval of the 2021-2030 NECP and that of the various instruments, and the impetus provided by the Recovery, Transformation and Resilience Plan, **have made it possible to increase the forecasts contained in the NECP, with higher** levels of ambition.

In compliance with the NECP and the various roadmaps, more than 170 strategic documents and standards have been approved since 2020, which have translated the strategic objectives into

---

<sup>6</sup>[Fair transition strategy](#)

<sup>7</sup>[Spain, 4 years moving towards just transition](#)

<sup>8</sup>[Hydrogen Route Sheet: A commitment to the Renewable Hydrogen](#)

<sup>9</sup>[Energy Storage Strategy](#)

<sup>10</sup>[Self-consumption Road Sheet](#)

<sup>11</sup>[Roadmap for the development of the Marine Wind and Marine Energy in Spain](#)

<sup>12</sup>[Biogas Route Sheet](#)

<sup>13</sup>[Roadmap for the sustainable management of Mineral Raw Materials](#)

specific provisions and regulations.

In addition, the NECP and the Strategic Energy and Climate Framework as a whole have provided a **reference framework** for the establishment of coherent targets in the design and implementation of sectoral **policies and measures**. Among others, a boost to industrial policy, which has seen electrification, decarbonisation and the circular economy attractive for investment in our country and has materialised in new factories or industrial activities aligned with this transition. It has also marked the development of the urban agenda around the renovation of the built stock and the transformation of public space to improve quality of life and modal shift in mobility. Synergies have also been identified with public health, through the “Strategic Plan for Health and Environment 2022-2026”.

**In the area of environmental policies, there have been relevant developments** consistent with the integrated energy and climate framework, ensuring synergies between this framework and the environmental agenda. Work on emission mitigation, linked to the opportunities offered by decarbonisation, interacts with the deployment of strategies for climate adaptation, biodiversity conservation and agricultural sustainability that have been activated by the Spanish Government since 2018, in line with the European Green Deal.

New standards linked to **environmental quality** are highlighted, such as measures to reduce emissions of air pollutants through the adoption of the National Air Pollution Control Programmes, which seek to ensure compliance with national air pollution control and reduction commitments. The new guiding framework to boost the **circular economy** has also had important developments such as the ‘Circular Economy Strategy 2030’ or Law 7/2022 on Waste and Contaminated Soil, with policy strands aimed at changing production and consumption patterns that contribute to reducing pressure on natural resources, including the concentration of polluting gases in the atmosphere, and to the reduction and better management of waste and/or water reuse.

Reforms and investments aimed at addressing and **reversing the deterioration of ecosystems** and their environmental services and **protecting terrestrial and marine biodiversity** have also been launched for the future. In this regard, the ‘National Strategy for Green Infrastructure, Connectivity and Ecological Restoration’ or the ‘State Strategic Plan for Natural Heritage and Biodiversity 2021-2030’, which seeks to integrate objectives for the conservation and sustainable use of natural heritage into sectoral policies; as well as the ‘Wetlands Strategic Plan 2020-2030’ which aims to halt wetland degradation and preserve habitats that provide important services and benefits to society; the ‘Marine Strategies of Spain of Second Cycle’ and the new ‘Maritime Spatial Planning Plans’, instruments that will help to organise the activity of different sectors and ensure the sustainable use of marine space).

In the area of **forest management**, which is so important to the climate change mitigation and adaptation objectives, reference instruments (‘Spanish Forest Strategy’ and ‘Spanish Forest Plan’) have been updated to boost the sector, align its development with environmental and climate commitments and highlight the role of our forests and forests in revitalising and balancing the socio-economic balance of rural environments with depopulation problems.

Synergies between the green transition and addressing the **demographic challenge** are also among the objectives of the energy sector. Therefore, among the measures of the Plan ‘130 Measures against the Demographic Challenge’, investments targeted at municipalities with fewer than 5.000 inhabitants in areas such as improving the energy efficiency of buildings and public infrastructure, generating and consuming renewable energy, boosting self-consumption and

energy communities or sustainable mobility stand out. These synergies are already being exploited through the programmes PREE 5000 – energy renovation of buildings – and DUS 5000 – for unique investments in clean energy and energy efficiency.

Due to their close link with the integrated energy and climate framework, special mention should be made of the ‘Strategic Guidelines on Water and Climate Change’ (drawn up in accordance with the guidelines of the Climate Change and Energy Transition Law) and responding to them, the **new Third Cycle Hydrological Planning 2022-2027**, which, for the first time, integrates variables and new climate scenarios and seeks consistency with climate change mitigation and adaptation objectives in strategic sectors, such as energy. The new water planning is in line with European legislation (Green Deal, Water Framework Directive, Zero Pollution Plan, etc.), defines ecological flows for all water bodies to protect the associated ecosystems and assumes a shift in water use, more in line with the future scenario of reducing resource availability that will affect all economic sectors linked to water management.

### **3. Green transition at the heart of economic recovery and strengthening energy security**

**The systemic nature of energy** for the well-being of society as a whole and for the functioning of the economy has been particularly relevant in recent years, due to the two recent crises, the COVID-19 pandemic and Russia’s invasion of Ukraine. Ensuring **security of supply** and accelerating the energy transition has been a top priority. **In this regard, the short-term challenges experienced in recent years have also been a common response to an acceleration of the green transition.**

As stated above, the Recovery, Transformation and Resilience Plan is making it possible to link *Next Generation EU* funds in Spain, as a firm commitment by the European Union to accompany and accelerate decarbonisation policies in response to the economic crisis caused by the COVID-19 pandemic. In this regard<sup>14</sup>, academic analysts<sup>15</sup> and<sup>16</sup> entrepreneurs and international bodies agreed that **the best response** – in economic and social terms – to the economic crisis triggered by the COVID-19 **pandemic was green investments.**

In this context, already in October 2020, the European Commission in its analysis of the Spanish NECP concluded that it was “a solid basis for Spain to design the climate and energy aspects of its national recovery and resilience plan”. In this way, energy and climate have been at the heart of the Recovery, Transformation and Resilience Plan. It thus establishes the **green rankings as one of its four backbone pillars, to which almost 40 % of the nearly EUR 70.000 billion of funds available is devoted.** The cross-cutting nature of this commitment is also important, since measures to accelerate the energy transition as a mechanism for recovery and the construction of a more robust and competitive economic model are embedded not only in energy or environmental policies, but also in infrastructure, industry, agriculture, digitalisation, training and skills, etc.

The incorporation of the green transition as the basis for Spain’s recovery plan has been welcomed by various analyses. In its assessment<sup>17</sup> of the Spanish Plan, the **European Commission**

---

<sup>14</sup><https://www.iea.org/reports/sustainable-recovery>

<sup>15</sup><https://www.ox.ac.uk/news/2020-05-05-building-back-better-green-covid-19-recovery-packages-will-boost-economic-growth-and>

<sup>16</sup><https://www.mckinsey.com/capabilities/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate>

<sup>17</sup><https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021SC0147&qid=1624628827022>

**gave the highest rating (“A”) in its contribution to the green transition.** Other expert analyses put the Spanish plan among the best in terms of its contribution to this transition<sup>18</sup>, and the consistency in this area with other measures and strategic objectives is also appreciated<sup>19</sup>.

Ultimately, the measures and guidance included in the NECP served the design of the PRTR, its targets were transformed into milestones and reforms that facilitate disbursements, and at the same time, the funding provided by the PRTR has allowed for more agility in meeting the decarbonisation objectives of the NECP. A positive feedback between the two instruments has therefore been established, so that the **Recovery Plan has made it possible to anticipate and activate earlier changes and structural measures envisaged in the NECP for the coming years.**

From the historical deployment of self-consumption and new models such as energy communities, the transformation of urban space and the improvement of public transport in coordination with the creation of low-emission zones, the decarbonisation of industry, resources never seen so far for the energy renovation of neighbourhoods and buildings, the start-up of new carriers such as renewable hydrogen, or the development of energy storage, the Plan has facilitated the implementation of the major priorities already included in the NECP, or earlier or with a greater impact than initially foreseen. In this regard, **the planning and anticipation exercise brought about by the NECP** and the consistency of the Recovery Plan with it have enabled **the business fabric and all actors to be better prepared to benefit from the funds**, which has been reflected in a high demand in the calls for proposals.

Finally, on 6 June 2023, the Council of Ministers approved the addendum to the Recovery Plan and its submission to the European Commission. This addendum provides for strengthened energy and climate measures, including boosting self-consumption and energy communities, renewable hydrogen and electricity grids for the integration of renewables, as well as strengthening the value chain of technologies needed to achieve climate neutrality, with the aim of developing manufacturing capacities for components and equipment for the energy transition and reducing external technological and industrial dependence.

The acceleration that the Recovery Plan is causing in the energy transition has also been taken into account in the update of the NECP, as indicated below.

Moreover, the **energy and geopolitical context has been marked by Russia’s invasion of Ukraine, leading to gas shortages, undermining the EU’s security of supply.** Thus, external energy dependence has been tantamount to a tangible threat to social welfare and economic competitiveness: one of the main challenges faced by families, businesses and administrations was conditioned by the price stress due to this energy dependency.

The European Union responded in a coordination and legislative proposal exercise at a pace never seen so far. In a few months there were several European Commission Communications and legislative proposals aimed at providing a coordinated response to the common challenge facing the Union. In May 2022, the Commission published the **REPowerEU Plan**, with policy and regulatory measures to save energy, accelerate the deployment of renewable energy, diversify sources of supply, strengthen coordination at European level for the purchase of gas. In addition, the Recovery and Resilience Framework was economically strengthened to accelerate the necessary transition. European targets for reducing the consumption of natural gas and electricity were also agreed.

---

<sup>18</sup><https://www.euractiv.com/section/energy/news/spains-green-recovery-plan-among-eus-best-experts-say/>  
<sup>19</sup><https://www.energymonitor.ai/policy/green-deals/france-and-spain-best-in-class-for-green-covid-recovery/>

In a similar vein, the International Energy Agency made concrete proposals to reduce Europe's dependence on Russian gas or focused on accelerating the energy transition.

In this context, since June 2021, Spain had taken more than 25 measures to mitigate the price crisis, protect vulnerable consumers, support industry and strengthen security of supply: to a large extent, measures aimed at accelerating the energy transition. In addition, during this period Spain approved an innovative mechanism to reduce the impact of the escalation of gas prices on the wholesale market, and to protect businesses and consumers, which has achieved savings of more than EUR 5.100 billion. The measures included the simplification of administrative processes for the penetration of renewables into the electricity system, the promotion of renewable gases, the promotion of self-consumption and energy saving and efficiency measures, as well as other measures aimed at strengthening security of supply and mitigating the impact on consumers' bills. In addition, as part of European efforts, in October 2022 the Government adopted **the More Energy Security Plan (Plan + SE), which introduced a total of 73 additional measures** on energy saving and efficiency, boosting energy transition in the areas of renewables, self-consumption and renewable gases, fiscal measures, consumer protection, strengthening strategic autonomy and solidarity mechanisms with other Member States. The acceleration of the energy and climate measures of the Recovery Plan was also identified as an indispensable tool.

The acceleration of the **energy transition** was thus one of the key levers to **strengthen Spain's and the European Union's strategic and energy autonomy** in the face of supply threats, as well as a tool **to protect consumers** by improving energy efficiency and replacing imported fossil fuels with indigenous renewable generation.

To strengthen European capacities for strategic autonomy, with the aim of having a European industry that provides the technologies needed for the energy transition, the European Commission launched the **Green Deal Industrial Plan Communication in February 2023**. The proposal consists of the development of a simpler regulatory framework to accelerate the green transition, in order to develop a competitive European industry. Three elements are included in this proposal: the **Fundamental Raw Materials Act**, in order to ensure sufficient access to materials that are essential for the manufacture of key technologies; **reforming the electricity market design** so that lower costs of renewables benefit consumers and **the net-zero industry law**, which includes as a target that 40 % of the net-zero emission technologies needed for the energy transition be made in Europe.

Spain's response to this energy crisis has therefore been based on further implementation and deployment of the Strategic Energy and Climate Framework, thus facilitating coherence between the actions needed in the short term with medium- and long-term objectives and measures.

#### **4. Boosting the green transition as a response to climate change**

The NECP is also the main strategic tool for organising and planning policies and measures to implement Spain's commitments to **climate change, which continues to have clear impacts on health, the environment and the economy**.

Last year 2022 has become the warmest year in Spain since there have been registers, adding that eight of the warmest ten years registered in Spain correspond to this century. With the latest available data, spring 2023 has been the warmest since there are records, but also the second driest, with 54 % less rainfall than usual. The increasing temperatures and severity of droughts

---

20<https://www.iea.org/reports/a-10-point-plan-to-reduce-the-european-unions-reliance-on-russian-natural-gas>

are **already having an impact on health**, with several thousand deaths attributed to the heat wave in 2022; **as well as on agricultural activity**, with damage that could increase significantly according to **the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)**<sup>21</sup>. The heat and drought situation has also contributed to the impact of forest fires: 2022 represented a **record record of burnt surface in Europe**, led by Spain, where the area burnt by fires tripled the average of the previous 10 years<sup>22</sup>.

Recent years have also seen the publication of the **IPCC Sixth Assessment Report**, which provides an update of knowledge on the scientific, technical and socio-economic aspects of climate change. In line with previous reports, it reiterates the clear link between human activity, mainly through the emission of greenhouse gases, and climate change, and deepens the analysis of its predicted impacts, which grow significantly in likelihood and severity the slower and more late the reduction of emissions. He also points out that **humanity is on time to avoid or limit the worst impacts of climate change** with ambitious measures in the short and medium term, and that **adopting these measures represents important opportunities** for health, equity, employment and social justice.

Other international analyses agree on the criticality of these effects of climate change. The *Global Risks Report 2021*<sup>23</sup>, *2022*<sup>24</sup> and *2023*<sup>25</sup> of the *World Economic Forum* puts environmental and climate risks as having the highest impact and probability of occurrence over the next ten years, above other assessed risks of an economic, social, geopolitical or technological nature.

**Spanish citizens have not been unaware of these challenges**: various surveys put our country among those most concerned about climate change at the Europe level<sup>26</sup> and/or indicate that Spanish citizens are in favour of measures to boost the energy transition. Thus, a survey by the European Investment Bank (EIB) <sup>27</sup> finds that 82 % of Spaniards say climate change is the biggest challenge facing society in the 21st century, while 81 % are in favour of more ambitious measures. For its part, the Special Eurobarometer 527 on perceptions of the energy transition <sup>28</sup> reveals very significant support for investments in sustainable mobility, energy renovation or policies aimed at reducing emissions by companies. Similarly, 59 % of Spaniards agree that climate change policies will generate net employment, and almost two thirds understand that this employment will be of good quality in terms of income, job security and the working environment. Other demographic work identifies that the energy debate is also present in other sectoral areas: for example, in foreign policy, energy supply is the priority among Spanish society<sup>29</sup>.

It is in this context that **international and European energy and climate commitments** have been strengthened, both by institutions and by the private sector, with a growing general consensus on climate neutrality in 2050 and the need for ambitious intermediate targets for 2030. Draws attention **to the aforementioned European Climate Law**<sup>30</sup>, which sets the binding objective of

---

<sup>21</sup><https://www.ipcc.ch/report/ar6/syr/>

<sup>22</sup>[European Forest Fire Information System \(EFFIS\).](#)

<sup>23</sup>[https://www3.weforum.org/docs/WEF\\_The\\_Global\\_Risks\\_Report\\_2021.pdf](https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf)

<sup>24</sup>[https://www3.weforum.org/docs/WEF\\_The\\_Global\\_Risks\\_Report\\_2022.pdf](https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf)

<sup>25</sup>[https://www3.weforum.org/docs/WEF\\_Global\\_Risks\\_Report\\_2023.pdf](https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf)

<sup>26</sup>[Public Opinion on Climate Change](#), IPSOS, April 2022.

<sup>27</sup><https://www.eib.org/en/press/all/2021-360-81-percents-of-spanish-people-in-favour-of-strict-governme-measures-imposing-behavioural-changes-to-address-the-climate-emergency?lang=es#:~:text=%2081%20%25%20%20%20respondents,emissions%20%20carbon%20%20202050>.

<sup>28</sup>[https://spain.representation.ec.europa.eu/noticias-eventos/noticias-0/nuevo-eurobarometro-los-europeos-stando-en-que-una-transition-ecologica-justa-es-2022-10-18\\_es](https://spain.representation.ec.europa.eu/noticias-eventos/noticias-0/nuevo-eurobarometro-los-europeos-stando-en-que-una-transition-ecologica-justa-es-2022-10-18_es)

<sup>29</sup><https://www.realinstitutoelcano.org/comentarios/asegurar-el-abastecimiento-energetico-se-convierte-en-la-prioridad-de-politica-externa-para-los-espanoles/>

<sup>30</sup>Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999

climate neutrality for the European Union in 2050 and a strengthened emission reduction target for 2030. For its part, the private sector is experiencing a growing trend of consumer and investor demand for compatibility of business models with this transition framework, with strategic betting that is assuming **historical record of investment in clean technologies**. Our country is already on the top 10 worldwide at this Inversión opportunity<sup>31</sup>.

#### **5. The update of the NECP reflects the progress made in recent years and the new energy context.**

The **European regulatory framework provides for an exercise to review and regularly update energy and climate plans**. Regulation (EU) 2018/1999 of 11 December on Governance for the Energy Union and Climate Action defines in its Article 14 a timetable for updating the Plans, whereby a draft update shall be submitted to the Commission by 30 June 2023. It also provides, in Article 17, that Member States are to submit progress reports every two years. The first progress report was sent to the European Commission on 15 March 2023. In the same vein and as stated above, the Law on climate change and energy transition also provides for a revision. In both revisions the targets can only be changed upwards.

In dealing with this updating exercise, account has been taken of the new European context and the progress made since the publication of the 2021-2030 NECP. Thus, the **contour conditions for this update are the following:**

- **Updating Europe's energy and climate targets.** The adoption of the European Climate Law resulted in the legal consolidation of the climate neutrality objective to 2050 and an increase in the targets at European level for 2030. As a result, the European Commission proposed a package of legislative proposals called 'Fit for 55' (also known as '*Fit for 55*'), designed to update various directives and regulations in areas associated with energy and climate to meet the targets set.
- **Update of macroeconomic data and input variables**, with new projections including the new context and more recent statistical data. **The modelling** exercise underlying the NECP uses variables calculated with common methodologies at European level to ensure the comparability of plans across countries.
- **The boost to the energy transition brought about by the Recovery, Transformation and Resilience Plan (PRTR)** The NECP guided the design of the Recovery Plan, which allows for an early response to much of the planned measures and accelerate the achievement of targets. This makes it possible, in this update of the NECP, to elaborate on the details of specific measures to reflect the contribution and precision that the Recovery Plan has made in them.

Highlights in particular the impact of the 12 Strategic Economic Recovery and Transformation Projects (PERTEs) which, by virtue of their synergies and joint impact, facilitate the necessary transformations, in this case in the field of the energy transition. In summary, the transformations implemented by the Recovery Plan facilitate the achievement of the new objectives set.

---

(‘European Climate Law’)

<sup>31</sup>[Energy-Transition-Investment-Trends-Exec-Summary-2022.pdf \(bbhub.io\)](https://bbhub.io/energy-transition-investment-trends-exec-summary-2022.pdf)

- **The impact of the crisis following the invasion of Ukraine and the Plan + SE.** This plan aims to **accelerate the energy transition, increase the protection of vulnerable consumers**, households and businesses; strengthening **strategic and energy autonomy**; and to strengthen **solidarity** with other Member States. It therefore contains additional measures to accelerate the structural changes already underway in terms of energy savings, renewable penetration, security of supply, consumer protection and new energy flows at European level. Therefore, as it contributes to the decarbonisation, efficiency, energy security, internal market and competitiveness dimensions provided for in the NECP, the impact of this plan is included in this update.
- **The specific roadmaps and strategies adopted in the Strategic Energy and Climate Framework.** The development of these documents has allowed for certain areas a particular level of **detail, precision and creation of visibility and certainty that can be incorporated into this update of the NECP.** In addition, the favourable framework created by the roadmaps has already allowed, in the short term, the growth and deployment of certain technologies or modes significantly higher than initially foreseen, going beyond the forecasts contained in the 2021-2030 NECP or, in some cases, the forecasts contained in the roadmaps themselves. This update therefore incorporates the outcome of the new ones.



two of these areas as a result of the implementation of the roadmaps, thus facilitating the achievement of the new objectives and enhancing coherence between the different instruments.

Highlights, by way of example, the deployment of self-consumption. The self-consumption roadmap set out penetration scenarios between 9 and 14 GW to 2030 depending on the implementation of the measures. **For this update of the NECP, in addition to being incorporated as a separate element, these forecasts are increased to 19 GW of self-consumption** in view of the deployment shown by this mode of generation due to the important work of facilitating it through new regulatory frameworks and the associated support measures.

- 

**Consistency with progress in energy and climate and environmental policy frameworks.** The regulatory and planning frameworks for energy and climate and for the environment have continued to evolve since the adoption of the NECP, so this update seeks to maintain consistency. In particular, **in the area of environmental policies, there have been relevant developments that the update of the NECP takes into account** to ensure coherence of public policies and to exploit synergies between the integrated energy and climate framework and other regulatory developments in the environmental agenda. The National Plan for Adaptation to Climate Change 2021-2030, the Circular Economy Strategy, which will help reduce the pressure of the productive system on natural resources; the National Air Pollution Control Programme 2030 (PNCCA), the State Strategic Plan for Natural Heritage and Biodiversity 2030, which promotes the conservation and sustainable use of terrestrial and marine natural resources, biodiversity and geodiversity; or the National Strategy for Green Infrastructure and Ecological Connectivity and Restoration, which, by 2050, sets out the guidelines for preserving the elements of green infrastructure in Spain – land and sea – so that spatial and sectoral planning ensures ecological connectivity.

This updating process also ensures consistency with water planning. In this regard, the Third Cycle Hydrological Planning 2022-2027, following the Strategic Guidelines on Water and Climate Change derived from the CCTE Law, defines, for the different river basin districts, lines of action to manage water resources in Spain so as to provide responses to the challenges of climate change, biodiversity protection and resilience building in strategic sectors).

A significant boost to the energy transition **is taking place as a result of the context and the measures taken.** The determined action to modernise and transform the economy and the energy system in Spain facilitates the implementation of the new commitments within the European Union. Thus, the measures and reforms that have been put in place since the first Plan was submitted, both through regulatory changes and through support for decarbonisation, highlighted in the Recovery, Transformation and Resilience Plan, but also the commitment by citizens, the business fabric and all public administrations, **have enabled the energy transition in Spain to take significant steps since the adoption of the NECP.**

**6. The process of updating the NECP maintains its solid technical basis and has mechanisms for involving the various actors.**

**Firstly, the technical and analytical basic approach of the Plan used to draw up the initial Plan is maintained, strengthening the analytical basis of the models.** Thus, the objectives and expected results for 2030 are the result of an **energy modelling and projection exercise**, based on an internationally recognised model such as the TIMES-Sinergia tool, in which the above changes in the energy system have been incorporated. This tool is complemented by other specific tools for the analysis of the electricity system (plexos and OpenTepes), the analysis of the macroeconomic impact (DENIO) and health (TM5-FASST), as well as the projections of greenhouse gas emissions (model of the Spanish Inventory and Projections System). All these analytical models are interlinked as a coherent system of results. This analytical exercise makes it possible to compare the contribution of each of the factors and measures to the achievement of the objectives. **A large team of experts and experts from different departments of MITECO** have also been set up, with **technical assistance from academic and advanced research centres** with extensive experience and knowledge in the fields of economy, energy and climate change, as well as with the collaboration of EER as System Operator. The NECP also integrates a **socio-economic impact analysis**, which concludes significant positive impacts on GDP, employment and public health, showing a **socially progressive effect**, i.e. with a higher positive impact on lower-income households.

**This technical work has been enriched by an extensive participation and consultation process.**

A preliminary public consultation process took place in August and September **2022**, with the aim of ensuring that the whole of Spanish society was informed, involved and presented its proposals on the NECP. During the consultation, **more than 2.000 contributions were received from more than 120 different actors**, most of them associations and businesses, but also from civil society, the public and academic sector, among others. These contributions have been analysed and considered in this update of the NECP.

**“Working days for the update of the integrated national energy and climate plan” were held in April and May 2023** 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 participating in the previous public consultation. The event was attended by a large number of organisations representing sectors interested in energy and climate policies, including representatives of civil society. Similarly, the approaches and reflections developed during these days have contributed to the drafting of this text.

Furthermore, as a tool to encourage public participation in climate action, the Law on Climate Change and Energy Transition calls on the Spanish Government to strengthen the existing participation mechanisms through the establishment of a Citizens’ Climate Assembly, at national level. Established in 2021, the Assembly issued a final report setting out the conclusions of its six working sessions, structured around five thematic axes, the Areas of Life and Society (AVS) for ecosystems, community, health and care; consumption, food and land use and work. This update of the NECP has taken into account the objectives and recommendations set out in the conclusions of the work of the Climate Citizens’ Assembly.

**In addition, this update of the NECP is submitted to a hearing and public information in order to gather input, comments and proposals from all stakeholders before the final document is drawn up.**

**7. The result of this process is a draft NECP 2023-2030 with a marked increase in ambition, with which Spain responds to European objectives, strengthens its energy and strategic autonomy and is placed in a context of social, economic and environmental opportunity.**

The updated NECP is divided into two main blocks:

- The first sets out the updating process, the objectives and main results, the existing policies and measures and those necessary to achieve the objectives of the Plan, analysing the synergies between them, as well as of the NECP with other Plans. Finally, it contains an analysis of the economic, employment, distributional and health benefits impact resulting from the implementation of this update of the Plan.
- The second block, made up of the annexes to the main document, includes the analytical part, detailing the projections of the scenario envisaged, as well as the descriptions of the various models that have made it possible to analyse prospectively and which provide robustness to the results. It also describes the interaction of the NECP with other Sustainable Development Goals and standards, as well as the public participation process. Finally, an analysis of progress in complying with the measures detailed in the 2021-2030 NECP is included.

Challenges, opportunities and mechanisms for action materialise across the five dimensions of the Energy Union: decarbonisation, including renewable energy; energy efficiency, energy security; the internal energy market and research, innovation and competitiveness. **As a novelty in this update, a cross-cutting component has also been included, with elements contributing to all or several of the five previously established dimensions, which reinforce the overall coherence of the Plan.**

The implementation of this Plan will transform the energy system towards greater energy self-sufficiency, essential in the current context of the recent war in Ukraine, based on making efficient use of our country's renewable potential, particularly solar and wind power. To this end, the deployment of these 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 energy imports of fossil fuels subject to geopolitical factors and high price volatility, as has happened in recent months.

This update of the NECP significantly increases the targets presented in 2020, the result of a context in which the green transition is accelerated to respond to three important prerequisites: climate change, recovery from the pandemic and the energy crisis.

Large transformers take the lead in this updated NECP: self-consumption, distributed generation, demand management, storage, energy communities. Through them, as well as specific measures to promote the proactive role of citizens in decarbonisation, the diversity of actors and the existence of participatory projects will increase both in renewable energy generation and in the energy system as a whole.

**The main results of this updated draft NECP are summarised below:**

- 1) Increased ambition in line with Spain's strong commitment to fight climate change and to deliver on the newFit for 55package.** This increase is the result of a context in which the green transition is accelerated to respond to three important prerequisites: climate change, recovery from the pandemic and the energy crisis.

The most ambitious targets include **emission reductions where the effort increases by more**

**than one third** compared to the 2021-2030 NECP, from 23 % to **32 % reduction compared to 1990 levels**.

**Renewable penetration is growing to 48 % of final energy consumption** in 2030, an increase over the decade higher than foreseen in the previous Plan, which was expected to reach 42 % of renewables in 2030. This increase is accompanied by strengthened measures to promote flexibility, storage and demand management.

**Final energy efficiency has improved by 44 % by 2030 compared to the 2007 baseline scenario**, while in the 2021-2030 NECP it stood at 41.7 %.

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

**In particular, the reduction in external dependency over the decade envisaged in the Plan is doubling**: this dependency is drastically reduced by 22 points over the period, representing a reduction of 10 points compared to the previous NECP, so that, according to the plan, **49 % 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 90.700 billion**.

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

The update of the NECP incorporates specific measures that provide greater support to vulnerable consumers, but also measures for the generation of positive socio-economic impacts in rural territories, progress towards a just transition and inclusion of a gender approach.

Consequently, in this update of the NECP:

- **Measures for biodiversity-compatible renewable development are updated.**
- **Measures are included for renewable development that establishes economic co-benefits in rural areas**, promotes the social development of these areas and improves territorial cohesion and the fight against depopulation.
- **Measures to protect energy and transport consumers and to combat energy poverty** are strengthened in line with policies carried out in recent years.
- This includes the **new Social Climate Fund**, which will make it possible to design new measures for consumers in general, with a particular focus on vulnerable and micro-enterprises, with the aim of strengthening territorial and social cohesion, introducing measures that favour progressivity with a particular impact on lower incomes.
- **Just transition measures are strengthened** with the inclusion of measures related to the Just Transition Fund.
- **Gender mainstreaming is mainstreamed** throughout the Plan.

- 4) **In the electricity sector, the renewables mix stands at 81 % in 2030** compared to the 74 % previously forecast, due to the increased integration of renewable energy into the electricity system, energy storage, significant growth in self-consumption and the renewable contribution of hydrogen production to decarbonise other existing fossil uses.

Renewable deployment is also accompanied by new measures to improve the social, territorial and environmental integration of projects.

- 5) **The focus on storage is strengthened to ensure the integration of renewables into the electricity mix**, with coordinated measures in several dimensions of the NECP. The rapid development of electric renewables makes it necessary to accelerate the installation of storage systems and demand-side management, which is 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 Energy Storage Strategy provided for 20 GW of energy storage by 2030. With the 2023-2030 NECP, these forecasts are exceeded, rising to 22 GW in 2030.

Thus, in addition to reinforcing the measure provided for in the original NECP on storage and flexibility, this update addresses with new measures the development of new hydroelectric storage capacity, taking advantage in particular of existing reservoirs, the launch of capacity markets to ensure the necessary investments in the medium and long term, as well as the necessary reform of the electricity market, which must also provide the necessary signals to accelerate 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 storage and demand-side management.

- 6) **A specific target for the deployment of self-consumption is set at 19 GW installed in 2030.** This technology is key to the democratisation of the energy sector and citizen participation, but also to business competitiveness. A robust and ambitious path by 2030 is possible thanks to developments in recent years, both at regulatory level and in the Recovery Plan, which goes **beyond the more ambitious scenario set out in the Self-Consumption Roadmap.**
- 7) **Electrification of the economy is increasing over the decade as one of the key drivers of decarbonisation**, increasing to 34 % in 2030. In particular, with regard to electric vehicles, projections are increasing to a fleet of 5,5 million electric vehicles in 2030 (10 % higher than the previously set target), while significant deployment of heat pumps is expected.

This progress in electrification facilitates not only the penetration of renewables in areas where fossil fuel use 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 accompanying mechanisms to facilitate broad access for society and the economic fabric to these more efficient alternatives and thus the possibility of making use of the cost savings they entail.

- 8) **More support levers are incorporated for the decarbonisation of the industry, which is essential for a sustainable industry, ensuring its global competitiveness.** Energy efficiency, technological innovation, electrification, self-consumption or green hydrogen are key levers for this. Among others, industry challenges the replacement 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 provided for in the NECP, partly driven by this PERTE, it is estimated that emissions from this sector will be reduced by more than 20 million tonnes of CO<sub>2</sub> equivalent between 2019 and 2030.

**9) Renewable gases are promoted: renewable hydrogen and biogas.**

**Close to 11 GW of electrolyzers are planned for 2030** for the production of renewable hydrogen, mainly for industrial uses. 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 in which this energy carrier will make a substantial contribution by the end of the decade. **The 11 GW path also represents an increase over the first estimates in the hydrogen roadmap, which set a target of 4 GW of electrolysis by 2030.**

For its part, the production of biogas and biomethane is also increased by exploiting the potential available, from different sources, and creating significant synergies with the private sector. **The forecast of biogas amounts to double the figure in the Biogás Roadmap, reaching 20 TWh in 2030.**

**10) Changes in transport and mobility are deepened by promoting healthier, more collective and more inclusive ways of living.**

This update of the NECP represents a stronger commitment to sustainable transport and mobility, building on the progress made in this area in Spain in recent years and the impetus provided by the Recovery Plan and the draft Sustainable Mobility Law. The transformation of cities is deepened, with the deployment of pedestrian zones and routes and the promotion of cycling through the construction of cycle paths, the adaptation of roads and urban space, the provision of safe parking facilities and the deployment of bicycle rental services or measures to calm road traffic.

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

In addition, the fleet of electric vehicles is increased to 5,5 million in 2030, accompanied by a roll-out of charging infrastructure.

**11) Strengthening energy renovation**, increasing the number of dwellings renovated to 1.377.000, as the PRTR investments are leveraged, in line with the Long Term Building Renovation Strategy (ERESEE).

**12) 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 in the aftermath of the war in Ukraine. In addition, the commitment to open strategic autonomy is more explicitly included. In addition to strengthening energy autonomy, specific measures associated with manufacturing and value chain technologies are incorporated into the technologies needed for the transition, and emphasis is placed on the raw materials needed to do so.

**In particular**, measures of an industrial nature are strengthened, both those related to boosting the value chain and those supporting the decarbonisation of industry where improved 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 Communication “Green Deal Industrial Plan” published by the European Commission in February 2023 and the proposal for a “net-zero industry law” published in March this year.

**13) The new Plan strengthens the positive social, economic, health and redistributive impacts.**

This draft NECP has a socio-economic impact assessment that updates that carried out for the 2021-2030 NECP, and concludes an improvement in the various indicators, due to the expected increase in investment and the strengthening of the economic advantages of reducing the energy dependency of the economy as a whole:

**The positive contribution of the NECP to GDP is reinforced**, generating an annual increase in GDP of EUR 34.700 billion in 2030. It represents an **increase in GDP in 2030** by 35 % higher than foreseen in the 2021-2030 NECP. The reduction in energy imports leads to savings of EUR 90.700 billion in the trade balance.

**The forecast of net job creation is also improved to 522.000 jobs in 2030**, above the level of up to 348.000 new jobs foreseen in the 2021-2030 NECP.

Finally, reductions in air pollutants lead to a **reduction of more than 5.800 premature deaths from air pollution causes by 2030**, from 11.952 premature deaths in 2019 (according to WHO/IHME) to 6.067 in 2030.

**14) To achieve these impacts, the measures provided for in the NECP have been extended and strengthened.** As a result, this update increases the number of measures from the 78 measures contained in the 2021-2030 NECP to reach 107 measures. In turn, the measures initially planned have been updated and some of their elements have been deepened, building on the progress made and lessons learned since the publication of the 2021-2030 NECP, as well as the increased knowledge and coordination of the various actors.

As a conclusion of this exercise, the updated NECP allows Spain to deepen the green transition, aiming to be one of the leading countries of the European Union in this area. 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, industrial job creation, innovation, technological development and the elimination of energy poverty, increasing the positive impact of this process, expanding the social, economic, environmental and health benefits.

# 1. SYNTHESIS AND PRODUCTION PROCESS

## 1.1. EXECUTIVE SUMMARY

Spain, within the framework of the European Union, has been addressing in recent years an intense green transition agenda which, in line with recent reports from international bodies such as the International Energy Agency, is an opportunity for the modernisation of the economy, the creation of sustainable jobs over time, the strengthening of competitiveness and the reduction of external energy dependency, which has shown itself to be a key factor of vulnerability in recent years. In turn, this transition is an opportunity for rural development, improved human health and the environment, and social justice. As the data from recent years show, Spain is particularly well positioned in terms of natural resource, as well as human, technological and industrial capacities, to address this transformation.

This commitment is also part **of the firm commitment to combating climate change, with the objective of achieving climate neutrality by 2050**, as set out in the Law on Climate Change and Energy Transition.

In order to make progress towards meeting these objectives, the National Energy and Climate Plan (NECP) sets the framework for action until 2030. As detailed below, the availability of new data, the development of a new context, the evolution of the energy transition in recent years and the update of the European regulatory framework for energy and climate make it possible to update the first NECP 2021-2030, drawn up in 2020.

This document therefore presents the first update of the NECP with targets for 2030, presenting, similarly to the first edition, a 'target scenario' in different areas of the energy transition, compatible and consistent with the path towards climate neutrality, which is achieved by complying with the policies and measures detailed in this document. This target scenario is the result of an energy modelling process that aims at minimising the costs of providing energy services, given the evolution of the different technologies and respecting the contour conditions established to meet the objectives of the five dimensions of the Plan.

Thus, in the scenario envisaged, the measures included in this update of the NECP will allow the following results to be achieved in 2030:

- 32 % reduction in greenhouse gas emissions compared to 1990
- 48 % renewables on final energy use
- 44 % (FEC) energy efficiency improvement
- 81 % renewable energy in electricity generation
- Have 19 GW of own consumption and 22 GW of storage
- Reduction of external energy dependency from 73 % in 2019 to 51 % in 2030
- 43 % reduction of emissions from diffuse sectors and 70 % reduction of sectors under emissions trading compared to 2005

**These results represent a 55 % reduction in GHG emissions compared to 2005, a trajectory compatible with the objective of making Spain a carbon-neutral economy by 2050.**

Compared to the first edition of the 2021-2030 NECP, there has been an increase in ambition in emission reductions, from a 23 % reduction compared to 1990 to a 32 % reduction. The increase



in renewables in terms of final energy use has risen from the 42 % provided for in the previous Plan to around 48 %, while external energy dependency is drastically reduced to a scenario in which 49 % of primary energy will come from indigenous sources, compared to 27 % in 2019, which is 10 points higher than the previous NECP.

In the electricity sector, renewable energy will provide 81 % of generation in 2030, compared with 74 % of the previous NECP, with a particular focus on self-consumption, which, thanks to the regulatory changes in recent years and the impetus of the Recovery, Transformation and Resilience Plan, will reach 19 GW in 2030. To integrate this amount of renewables into the electricity system, it is necessary to increase the presence of energy storage to 22 GW.

As a result, another major lever for decarbonising the economy will be electrification, reaching close to 34 % of the economy, which will increase by almost 9 percentage points compared to 2019 levels.

Green hydrogen becomes another player in this updating process, resulting in a forecast of 11 GW of electrolyzers, given the high expected penetration of this vector in industry, one of the key sectors to decarbonise.

Improving energy efficiency in all sectors, increasing the flexibility of the energy system, increasing industrial competitiveness and boosting the value chain, or developing new business models will also be key to the energy transition, largely driven by the PERTS of the Recovery, Transformation and Resilience Plan.

As a result of all the measures foreseen in this plan, there will be a greater impact on economic growth and employment, resulting in an annual GDP increase of EUR 34.700 billion and employment growth of 522.000 jobs.

In line with the Regulation on Governance for the Energy Union and Climate Action, these results and the measures to achieve them are structured around the five dimensions outlined below.

### **Decarbonising the economy and advancing renewables**

According to the forecast made by this Plan, the measures set out in it will achieve a 32 % emission reduction level in 2030, an increase of more than one third compared to the forecast in the first edition of the NECP, which set emission reductions for 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, fluorinated gases and industry not subject to emissions trading) contribute to this objective with a reduction of 43 % in 2030 compared to 2005 levels, while the sectors subject to emissions trading (ETS) do so with a decrease of 70 % compared to 2005.

The measures in the draft NECP 2023-2030 **result in total gross GHG emissions rising from 309,8 MtCO<sub>2</sub>eq in 2019 to 194,6 MtCO<sub>2</sub>eq in 2030**. The sectors of the economy that, in absolute terms, reduce the most emissions in that period are those of electricity generation (**33 MtCO<sub>2</sub>eq**), dominated by a strong penetration of renewable generation, as well as mobility and transport (**32 MtCO<sub>2</sub>eq**), mainly thanks to modal shift and the commitment to 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. Added to these are industry (combustion) and the residential, commercial and institutional sector, with additional decreases **of 18 and 12 MtCO<sub>2</sub>eq respectively**.

The Plan foresees for 2030 total installed capacity in the electricity sector of **214 GW**, of which **160 GW are renewable generation, and 22 GW of both daily, weekly and seasonal storage**. The distribution between different technologies is indicative and will depend on the technological evolution, costs, availability and integration capacity of the different technologies. As an initial estimate, 62 GW is projected to be wind energy, including 3 GW offshore wind; 76 GW solar photovoltaic, including 19 GW self-consumption, which becomes very important; 14.5 GW hydraulic; 4.8 GW solar thermoelectric; there are also contributions from other renewable generation technologies. For non-renewable technologies, 203 026.6 GW of combined gas cycles and 3 GW of nuclear are expected, all of which are already existing plants.

As indicated above, the precise breakdown between technologies presented in this document corresponds to the current projection based on the costs and assumptions considered in the modelling exercise (see Annexes A and B). The specific distribution by renewable technologies to be carried out annually until 2030 will depend, in any event, on the evolution of the relative costs of renewable technologies, as well as on the feasibility and flexibility of their deployment. Therefore, their relative weight may vary, within margins, from the figures presented in this Plan.

In line with the continuity of the process of decarbonising the electricity sector, together with the forecast of future prices for CO<sub>2</sub> emissions, as a result of the application of the EU market instruments (TCO<sub>2</sub>eq price of EUR 76 in 2030 at constant 2016 prices, according to the parameters recommended by the European Commission for updating the NECPs) and the relative price of gas, coal power plants are estimated to cease supplying energy to the system from 2025 onwards. To accompany the impacts of these closures, the 'Agreement for a Just Energy Transition for thermal power plants in closure' has been signed between the Spanish Government, the companies owning the plants and the trade unions, with the aim of putting in place measures to support workers and promoting alternative investments in the affected areas.

**Renewable electricity generation in 2030 will be 81 % of the total**, consistent with a trajectory towards a 100 % renewable electricity sector by 2050. In a scenario of such a high renewable penetration, 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 commitment to energy storage and/or demand management** with specific measures, which will be key to enabling greater integration of renewable generation into the system. In addition, the update of the NECP responds to the new reality in which there are many renewable projects, strengthening measures to determine the development area of the facilities, taking into account both cooperation with territorial administrations and the generation of benefits for local communities.

Annex D to the Plan, for its part, sets out the reports containing the simulations of generation dispatch in 2030 carried out by Red Eléctrica de España (REE).

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

In addition, self-consumption and distributed generation, demand management, the promotion

of energy communities, as well as 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 participatory projects, both in activities related to renewable energy generation and storage, demand management and increased flexibility across the energy system as a whole. Significant progress has already been made 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 actions in the field of energy, the Plan addresses the need to tackle emissions in **diffuse non-energy sectors**, as well as to harness the potential for GHG removals by natural sinks. The Plan proposes measures to bridge the gap between projected emissions and Spain's commitments for the non-energy diffuse sectors up to 2030.

Finally, the Plan sets out the long-term climate benefits of the land use, land use change and forestry sector, and its potential contribution to the 2030 emission mitigation target, which can be achieved by implementing the planned measures.

### 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 well-being and economic activity while reducing energy consumption in absolute terms.

In this regard, as part of the negotiation of the Fit for 55 package, the current proposal for the Energy Efficiency Directive sets a binding EU-wide energy efficiency improvement target of 38 % in terms of final energy consumption<sup>32</sup>, compared to the European Reference Scenario. **The measures included in this plan will significantly exceed this target by achieving an energy efficiency improvement of 44 %.** To help reduce energy consumption, the Directive specifically sets energy savings targets for Member States, including a trajectory by which they should achieve annual final energy savings of 1.3 % in 2024 and 2025, 1.5 % in 2026 and 2027 and 1.9 % in 2028, 2029 and 2030 (always relative to the average consumption of the years 2016 to 2018).

The Plan also proposes that **public administrations should be exemplary in terms of energy saving and efficiency**. It therefore proposes initiatives to meet the objectives set in the proposal for an Energy Efficiency Directive to renovate the public building stock (3 % per year) and to reduce consumption by public bodies (1.9 % per year in final energy compared to 2021). In accordance with the Energy Efficiency Directive, the Plan encourages the Autonomous Communities and Local Authorities to endorse at least the mandatory 3 % renovation target for the General State Administration of the built-up and air-conditioned area of the public building stock, since the extension of obligations to local authorities is included in the current Energy Efficiency Directive. Among others, **energy performance contracting** will be one of the mechanisms that will allow such actions in the public sector.

Thanks to the measures included in this update of the NECP, energy efficiency will increase in all sectors, largely thanks to the momentum of the reforms and investments of the Recovery, Transformation and Resilience Plan and the progress achieved in these years.

Thus, a greater modal shift is expected both in urban areas and in the area of freight, with a renewed and targeted commitment to a **greater presence of rail**. This update also provides for **greater penetration of technologies such as heat pumps or renewable heat**, both for individual use and for heating **and cooling networks**, as well as increasing **the projected renovation of the**

---

<sup>32</sup>Not including non-energy uses.

**existing housing stock, all of which are levers for improving energy efficiency, which is crucial for the energy transition.**

As a novelty in this update, **improvements are envisaged in technology and process management systems in energy intensive industries**, 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.

The use of **Energy Saving Certificates (EACs)**, which promotes investments in energy efficiency actions in different sectors and represents an important alternative to aid programmes and other support mechanisms, is also highlighted as an important tool 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 supply. This challenge has mobilised extraordinary work on European energy policy, both because of the pace of adoption of new regulations and the scope of the measures.

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

The NECP in force already considered the need and benefits of increasing energy independence, both by reducing energy bills and their savings in the trade balance, and by reducing vulnerability due to dependence on fuel imports, with the associated price volatility. This draft continues the path towards ensuring a secure, clean and efficient supply of energy to the various consumption sectors, which needs to be addressed from the various levels that make up energy security:

- Increasing the protection of vulnerable consumers
- Reduction of dependency, in particular 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

Specifically, as regards reducing energy dependency, the reference point is primary energy consumption 2019, 126 Mtoe (including non-energy uses), of which 92 Mtoe was fossil fuels, almost entirely imported.

Following the implementation of the measures included in this Plan, renewable and efficiency actions **will improve external energy independence from 27 % in 2019 to 49 % in 2030, which, in addition to improving national energy security, will have a very favourable impact on the trade balance, leading to savings of over EUR 90.000 billion in imports.** This means almost doubling the impact on the increase in external energy independence projected in the previous edition of the Plan, improving by 10 percentage points in 2030.

Security of **electricity supply is at the heart of energy security.** The analyses carried out by various models suggest that the security of the electricity supply of the generation mix

**presented in this draft is guaranteed.** In Annex D.2 (*Supply Guarantee: Probabilistic analysis of the coverage of the Objective 2030 Scenario*) this technical analysis is presented. For this purpose, specific models for the electricity sector described in Annex B have been used.

On the security of electricity supply in relation to coal disposal, brought forward to 2025, and part of nuclear power generation by 2030 (four of the seven reactors will be withdrawn), both covered by this update, the following points should be noted:

**First**, the power generation withdrawn is offset by the significant penetration of renewable electricity generation technologies, in particular solar and wind.

**Second**, Spain has made a strong commitment to energy storage in both the Energy Storage Strategy and the ‘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 renewable production collected in the scenarios of this draft. This update of the NECP reinforces the focus on storage to ensure the proper integration of renewables.

**Third**, the reform of the electricity market, currently in negotiations at European level, will be essential to provide the right signals to accelerate investments in storage and demand management. To this end, the development of capacity markets will be particularly important.

**Finally**, the above-mentioned EER reports conclude that there are full guarantees of supply in the Scenario provided for in this Plan in the various climate scenarios.

In turn, and in line with the 2050 climate neutrality objective, the Plan envisages the need to anticipate and plan, together with the System Operator, the technologies, procedures and mechanisms to ensure security of supply without greenhouse gas emissions.

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

- Implementing the Plan + SE, which sets out three key objectives:
  - TO** increase the protection of vulnerable consumers, households and businesses, in addition to the measures already taken. Both energy saving and renewable replacement measures and specific consumer support measures contribute to this.
  - TO** strengthen strategic and energy autonomy by putting in place additional measures to accelerate the structural 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 and make each of its members stronger. Thus, maximising the use of existing infrastructure allows for a relevant exercise of energy solidarity with the EU as a whole. In addition, it must be ensured that any new infrastructure is compatible with the medium- and long-term decarbonisation objectives.
- Strengthen the provision of strategic primary materials for the energy transition.
- Promote the various technologies and services providing flexibility such as energy storage and demand-side management.
- Increasing the interconnection of electricity systems, which will help to reduce potential negative impacts due to supply constraints or disruptions (see Internal Market section).

- Deepening contingency preparedness, which is currently very advanced, in the context of the various international areas to which Spain is committed:
  - a. In the case of the International Energy Agency (IEA), important steps have recently been taken with, for example, the creation of a Gas Task Force.
  - b. At European level, although various urgent rules were adopted in 2022 to deal with the crisis situation, it is necessary to enshrine this preparation at national level by updating and approving the Risk Assessment, 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, which are currently under revision.
- Reducing energy dependency on islands, for which the sustainable energy strategies developed for each archipelago are key.
- Develop the National Security Strategy and the Energy Security Strategy, highlighting the need to strengthen cybersecurity in the energy field by improving capabilities to prevent, detect and respond to cyber-attacks in order to ensure the safe use of energy systems.

### **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 adequate protection of consumers, in particular vulnerable consumers, as well as enhanced competition and effective integration into the European market, with relevant infrastructure.

The advancement of renewable development, as well as the current stress behaviour of the European electricity market, such as price volatility, have shown that the current market design is not effective in achieving decarbonisation objectives or in responding to price pressures. It was therefore necessary to launch a European debate in order to initiate a reform of the electricity market. In advance, and as a transitional solution, in the case of Spain and Portugal, the so-called Iberian mechanism was developed, which aims to reduce the impact on the prices perceived by final consumers in a context of high volatility, where there is the uniqueness of a low level of interconnections. As a result, the future design of the electricity market, which pursues three main objectives, is under negotiation at European level:

- 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 fair energy transition, ensuring affordable access to electricity for households, and incentivising the necessary investments in the electrification of our economy. In addition, competitive prices are essential to enable European industry to compete on a level playing field on international markets.
- Second, the future market design should incentivise the necessary investments in renewables to meet decarbonisation objectives in the most efficient way. To this end, negotiations are ongoing to facilitate access to long-term contracts by removing market barriers to the development of long-term contracts (PPAs) and by removing regulatory barriers to the development of contracts for differences (CFDs), thus providing certainty for renewable energy investors.
- Thirdly, to incentivise the necessary investments in technologies that provide the

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

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

In this respect, the 2021-2026 Electricity Transmission Network Development Plan has been approved as the development of the current NECP. The implementation of the infrastructure associated with this Planning 21-26 will prepare the transmission network to be able in the coming years to connect and integrate more renewable energy. Thanks to their development, 67 % of electricity generation will come from green sources in 2026. The planning design has been based on compliance and the generation and demand assumptions of the current NECP, applying an integrated and coordinated perspective with this strategic planning. In addition, as already provided for in the More Energy Security Plan, with the aim of adding flexibility to the Electricity Planning and strengthening the capacity to anticipate and adapt to the challenges of the energy transition, it provides for the possibility of making ad hoc amendments to the current 2021-2026 Planning to make strategic projects viable in the short term, and work on a new Planning for the period 2024-2029 will start.

Moreover, increasing interconnections within non-peninsular electricity systems will have a direct impact on energy and climate, facilitating further integration of renewable generation and strengthening security of supply.

At Community level, the degree of interconnection of the Iberian electricity system with the rest of the European continent is below the targets set. **Currently, Spain's interconnection ratio is less than 5 %** of the installed generation capacity in the system. In 2023, our country will **be the only country in the European Union below the 10 % target**, so it will be necessary to further develop new interconnections:

- New interconnection with Portugal, which will allow for an increase in the capacity of up to 3.000 MW.
- New interconnections with France, which will increase interconnection capacity to 8.000 MW:
  - Bay of Biscay Project: between Aquitaine (FR) and the Basque Country (ES)
  - Interconnection between Aragon (ES) and Pyrénées Atlantiques (FR)
  - Interconnection between Navarra (ES) and Landas (FR)

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

The Plan encourages various measures to protect and strengthen the role of consumers. With regard to energy poverty, the Plan integrates the provisions of the **National Strategy against**

**Energy Poverty<sup>33</sup> adopted** on 5 April 2019 by the Council of Ministers, which is the instrument that will make it possible to address the phenomenon of energy poverty from a comprehensive perspective and with a medium- and long-term perspective. To this end, various regulatory measures have been developed so far to address the phenomenon of energy poverty, including the creation of a ‘minimum vital supply’, as well as amendments to access to the social bond, extending the recipients of this figure. This has strengthened the social protection shield for people in energy vulnerability.

### Research, Innovation and Competitiveness

The Ministry of Science and Innovation (MCIN) 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, together with its funding agencies and its affiliated bodies. Notable common points included:

- The **National Research Agency (REA)**, a funding agency attached to the MCIN, whose mission is to promote scientific and technical research in all areas of knowledge, the generation and transfer of knowledge and the resolution of major societal challenges through the competitive and efficient allocation of public resources, including public-private partnerships, the monitoring of funded actions and their impact, and advice on the planning of actions or initiatives implementing AGE’s R & D & I policies.
- **The Centre for Technological Development and Innovation (CDTI)**, a public business entity attached to the MCIN, which is aimed at promoting business innovation and boosting research, experimental development and the incorporation of new technologies in the business sector, with a view to increasing the competitiveness of Spanish companies by raising their technological level. The CDTI also encourages Spanish participation in the European Union’s Framework Programme for Research and Innovation, currently Horizon Europe, by all types of entities, both public and private, including universities, public research centres, technology centres, public administrations, associations, foundations, businesses, etc.
- The public research bodies, 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)**, which focus on the implementation of the programmes.

This dimension of the plan is under the umbrella of the **Spanish Strategy for Science, Technology and Innovation (EECTI 2021-2027)**, which is the strategic planning instrument to achieve the proposed objectives in the field of R & D & I and develops them in the field of energy and climate in the framework of the State Plan for Scientific and Technical Research and Innovation, currently PEICTI 2021-2023.

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

R & I & c activities aimed at combating climate change and fostering the energy transition are structured along the following lines of work:

- Energy efficiency, characterised by its cross-cutting nature in terms of technologies and

---

<sup>33</sup>[https://www.miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergetica2019-2024\\_tcm30-496282.pdf](https://www.miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergetica2019-2024_tcm30-496282.pdf)



sectors concerned.

- Renewable energy technologies.
- Flexibility and optimisation of the energy system through the implementation of technologies that provide flexibility to the electricity system, which is essential to achieve a high degree of penetration of the non-manageable renewable generation system.
- Electric vehicle: batteries and installation and optimisation of recharging points.

As regards **competitiveness**, Spain is one of the European countries with the greatest potential to exploit renewable energies: it is the country with the largest solar resource across Europe and is among the countries with the largest wind resource. This allows renewable energy generation in Spain to become a reality at prices significantly lower than those of other energy carriers, thus increasing the competitiveness of the economy and improving households.

Spain is already well positioned in part of the value chain and R & D & I capacities associated with the energy transition, from renewable energy, power electronics, storage or renewable hydrogen. For example, in the photovoltaic sector, the country has more than 60 % of the value chain, while in the wind sector this figure stands at 90 % and places Spain as a third country of the European Union in R & D investment. In order to maximise the opportunities of this transition and strengthen Spanish and European strategic autonomy in this area, it is necessary to strengthen the position of the sector in the areas in which it is already a leader. strengthen others with fewer 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 respond to the energy transition in Spain, in Europe and globally.

Progress in these actions will contribute to the European target of manufacturing 40 % of zero-emission technologies in Europe, as set out in the proposal for a “Law on net-zero industry” prepared by the European Commission in March 2023.

There is a strong knowledge capital in the field of energy, with two public research bodies, CIEMAT and CSIC, research centres such as the National Renewable Energy Centre (CENER) and the National Hydrogen Centre (CNH2), institutions such as the Institute for Diversification and Energy Saving (IDAE) or the Renewable Energy Control Centre (CECRE) of Red Eléctrica de España (REE), 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 map, among which in the energy field the National Fusion Laboratory (LNF), the Almería Solar Platform (PSA) and the Integrated Maritime Experimentation Infrastructure (MAHRIS), with nodes such as PLOCAN, iClem, Bimep and CCOBB. In the area of climate, there are infrastructures such as the Doñana Biological Reserve, SOCIB (Coastal Observation System of the Balearic Islands), Spanish Antarctic Basis and FLOTA Oceanographic.

Reducing electricity costs through the use of renewable technologies will provide a clear competitive improvement for electricity-intensive businesses. The development of the Industrial Decarbonisation PERTE will also make it possible to increase the presence of renewable energy sources in the industrial sector, both with the growth of self-consumption, which is currently increasing, and in the provision of renewable heat at medium to high temperatures. In addition, the PERTE provides for the implementation of comprehensive energy efficiency plans in industrial sectors that are complementary to other actions, such as changes in production processes towards those with the available technical improvements. 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 2023-2030 NECP**

The analysis of the socio-economic and health impact of the first NECP has already shown that the energy transition set out in this Plan represents an important economic and employment opportunity for our country. Recent international analyses agree on this diagnosis. For example, the OECD study *Investing in Climate, Investing in Growth* 34 points out that complying with the Paris Agreement would generate immediate positive impacts and increase GDP in 2050 by up to 2.8 % on average in the G20 countries. Other studies such as IRENA *Global Energy Transformation* 35 agrees with the OECD on these positive impacts and points out that within the G20 countries that benefit most will be those in southern Europe. Finally, and more recently, in its report *Technology Energy Perspectives 2023*, the International Energy Agency predicts that, if the announced energy and climate commitments are met, global industrial jobs in energy transition will rise from 6 million jobs today to almost 14 million by 2030.

In addition, various industry associations have estimated the impact on the economy of the energy transition in recent years, coinciding with an important contribution to our country's job creation, gross value added and export capacity.

With a view to this update of the NECP, a new technical impact analysis has been carried out (see Chapter 4), the most relevant conclusions of which are set out below.

The results obtained are determined by two main types of effect. The first effect comes from inversiones<sup>36</sup>. It is estimated that achieving the new objectives of the NECP will require a cumulative total investment of EUR 294.000 billion until 2030, an increase of 22 % compared to the original plan. These investments can be grouped by renewable measures<sup>37</sup> (40 %), energy saving and efficiency (29 %), electrification of the economy (12 %), networks (18 %) and measures for diffuse non-energy sectors (1 %). 85 % of investments would be made by the private sector and 15 % by the public sector. Moreover, it is noteworthy that thanks to the Next Generation EU funds and the PRTR, a significant share of public investments, 70 % of them, are financed by European funds.

The second is the effect of 'energy change', which captures the economic boost resulting from (a) savings generated in the energy bills of businesses and families, which frees up resources for other types of expenditure and (b) the change in the energy mix, which replaces imported fossil fuels with indigenous renewable energy sources that reduce the price of energy (electricity) and generates a higher aggregate value within the country due to lower energy dependence on external sources.

The combination of both effects explains the positive macroeconomic impact of the NECP that would result in an increase in GDP of EUR 34.700 billion in 2030 (+ 2.6 % in 2030 compared to the trend and 35 % higher than foreseen in the original plan) and an increase in net employment of 522.000 jobs in 2030, 50 % higher than the increase foreseen in the current NECP.

Finally, the impacts on air quality and health have been analysed. The main air pollutants are

<sup>34</sup><https://www.oecd.org/env/investing-in-climate-investing-in-growth-9789264273528-en.htm>

<sup>35</sup>[https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA\\_Report\\_GET\\_2018.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf)

The additional investments<sup>36</sup> are estimated by taking the investments from the NECP against a trend scenario. In this trend scenario, for example, the share of renewable energy in final consumption would reach 25 % in 2030, compared to the 45 % projected in the current NECP.

<sup>37</sup>Renewables include investments associated with hydrogen-dedicated renewables, as well as investments in electrolyzers.

significantly reduced compared to 2019, which is the case for PM<sub>2.5</sub> (-44 %), SO<sub>2</sub> (-58 %) or NO<sub>x</sub> (-54 %) emissions. The decrease in pollution leads to a 49 % reduction in premature deaths by 2030, from 11.952 premature deaths in 2019 (according to WHO/IHME) to 6.067 in 2030.

### **Process for updating the National Energy and Climate Plan**

The process of updating the NECP responds to several issues, which are summarised in an increase in climate ambition and a new energy context of accelerating the energy transition driven by the PRTR, and by the need to strengthen strategic autonomy. Furthermore, Article 14 of the Governance Regulation requires the plans to be updated in June 2023.

The energy landscape has changed sharply since the adoption of the previous NECP, as a result of developments in recent years, such as the COVID-19 pandemic, which impacted economic growth and energy consumption; as well as following the subsequent recovery at global level, and to a large extent the drive of the PRTR to the energy transition. On the other hand, the crisis caused by Russia's invasion of Ukraine has put at the heart of the social, economic and political focus the criticality of energy security, highlighting the vulnerability of external energy dependence in terms of prices, trust and availability of supply, and has led to a stronger commitment to the energy transition and the strengthening of its value chain by European, national, regional and local institutions, as well as by the entire business fabric.

As regards climate ambition, the current NECP was designed in a context of European targets that have been overtaken by the 'Fit for 55' package, whereby the ambition in emission reductions has been increased to 55 %, accompanied by new regulatory proposals that increase the targets for energy efficiency, renewable energy and emission reductions, while at the same time extending the number and disaggregation of sectoral targets related to these parameters. This update of European targets therefore entails the need to update the plans of the respective Member States.

A summary summary of the various effects and factors considered in this update process is provided below.

#### **Firstly, the basic analytical approach of the Plan used to draw up the initial Plan is maintained.**

Thus, like the previous Plan, the objectives and expected results for 2030 are the result of a robust and detailed energy modelling exercise based on several models used at international level: the TIMES- Synergy tool, for the modelling of the energy system as a whole; specific tools for electricity system analysis (plexes and OpenTepes); analysis of the macroeconomic impact (DENIO) and health (TM5-FASST), as well as projections of greenhouse gas emissions (model of the Spanish Inventory and Projections System). A large team of experts and experts from different departments of MITECO have also been set up, with technical assistance from academic and advanced research centres with extensive experience and knowledge in the fields of economy, energy and climate change, as well as with the collaboration of EER as System Operator.

#### **Secondly, the acceleration impact 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 push forward and accelerate the decarbonisation agenda. In response to this crisis, the EU launched NextGenerationEU, an investment of EUR 750.000 billion, of which 90 % is articulated through the Recovery and Resilience Facility.

In order to channel the funds due to Spain from this mechanism, Spain has drawn up the PRTR. As the European Commission pointed out in its analysis of the Spanish NECP, it provides a firm basis for the design of the climate and energy measures of the PRTR.

The PRTR will mobilise around EUR 70.000 million, 39.7 % of which will be spent on the green transition, which is the main driver for implementing the Plan, confirming Spain's commitment to transforming the economy in order to promote a sustainable future and the opportunity for society and the economy as a whole that is the driving force behind this transformation.

In this way, the PRTR has made it possible to implement, speed up and strengthen policies and measures provided for in the NECP: from investment by different public entities to strengthen public transport or infrastructure facilitating walking and cycling; a massive commitment to the energy renovation of entire neighbourhoods and buildings, with accompanying measures such as 'rehabilitation offices'; the accelerated deployment of renewable energy, especially those integrated into buildings or production processes, such as self-consumption or the use of thermal renewables in industry or services; storage facilities facilitating the integration and management of renewables; the deployment of renewable hydrogen moving fossil fuels across different sectors; energy improvement of the public infrastructure itself; or policies that accompany and facilitate the positioning of industrial sectors to the timeliness of the energy transition. Chapter 3.6.4 contains a detailed analysis of the synergies and interlinkages between the measures included in the PRTR and those contained in this updated NECP.

Apart from the resources mobilised through the PRTR, account should be taken of the addendum approved by the Council of Ministers on 6 June 2023, which provides for more than EUR 10.000 million in grants and up to a maximum of EUR 84.000 million in loans. These resources will, inter alia, enable the continuation of exceptionally successful support programmes, such as those related to self-consumption and storage behind meter or renewable hydrogen, as well as to open new strategically essential lines such as those related to industrial value chain support linked to the energy transition.

With regard to investments, the addendum focuses on increasing the allocation of the 12 PERTEs currently in place, in particular to strengthen those that contribute to Spain's greater strategic autonomy in terms of energy security, agri-food, technological and digital security.

The package of measures and investments boosted under the Recovery Plan puts the country in a more robust position for the continuation of the energy transition over the decade.

**Third, the context following Russia's invasion of Ukraine has been taken into account.** Therefore, another of the strategic documents included in this updating process is the Plan + SE, approved in October 2022, with the aim of providing more security against energy prices for households and the Spanish economy as a whole and contributing to increasing the European Union's security of supply.

In this context, one of the pressing needs is the strengthening of Spain's and Europe's strategic autonomy, inter alia in the face of the energy transition. The net-zero industry regulation, which aims to increase the manufacturing of clean technologies in the EU and to ensure that the EU is well equipped for the clean energy transition, is being developed. This reduces the risk of shifting emissions to other regions and protects the potential of European industry. Together with the European Critical Raw Materials Act and the reform of the electricity market design, it sets out a clear European framework to reduce the EU's dependence on imports and foster its strategic autonomy, helping to increase the resilience of European clean energy technology supply chains.

This legislation will help drive the value chain and increase the manufacturing of leveraging

technologies for climate neutrality in the EU to provide at least 40 % of the EU's annual deployment needs for net-zero strategic technologies by 2030, including sustainable energy.

The initial NECP already listed the opportunities of the energy transition for the whole value chain, as an opportunity for the development of new technologies, industrial capacities or business models that contribute to this transformation. In the light of the context described above, this update more explicitly incorporates the commitment to strategic autonomy, both with a significant increase in the reduction of external energy dependency, as well as with specific measures associated with manufacturing and technologies in the value chain and the strategic raw materials needed to do so.

Another set of elements that have served as the basis for this process of updating are the Route Sheets and Strategies that have been approved over this period. **These roadmaps and strategies are precisely the development of some of the measures that the NECP itself enacted and** have made it possible to specify and develop these measures, deepening how these sectors will contribute to the decarbonisation of the economy as a whole, completing the Strategic Framework for Energy and Climate. In particular:

- The Hydrogen Roadmap: a commitment to renewable hydrogen
- The Energy Storage Strategy
- The Road Map for Self-Consumption
- The Roadmap for the Development of the Marine Wind and Marine Energy in Spain
- The Biogás Roadmap
- The Roadmap for the Sustainable Management of Mineral Raw Materials

These roadmaps and strategies have already demonstrated the potential to meet the objectives set out above: 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 allowed the quantitative forecasts contained in these roadmaps to be exceeded, thus contributing to the increase in ambition that this update of the NECP is intended to achieve.

**On the other hand, an extensive participation and consultation process has been carried out during the process of updating the NECP.**

- First, a preliminary **public consultation process took place in August and September 2022** to ensure that Spanish society as a whole is informed, involved and put forward its proposals on the NECP. More than 2.000 contributions have been received during the consultation from more than 120 different actors, most of them associations and businesses, but also from the public and academic sector, among others.
- More recently, “working days for the update of the integrated national energy and climate plan” have taken place 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 participating in the prior public consultation. The event was attended by a large number of organisations representing sectors interested in energy and climate policies, including representatives of civil society such as non-governmental, trade union, environmental, rural and consumer organisations; business organisations in the waste sector, etc.; market monitoring and operation organisations; and representatives of the research and development sector.
- Another process of submission, participation and consultation is this public hearing and information to which this draft is submitted.

**Finally, as a central part of the Strategic Energy and Climate Framework, the Plan maintains and updates its coherence with the different planning or strategy instruments relevant in this context.** The NECP is also connected to the other major aspect of climate change, namely **adaptation** to the pressures and impacts resulting from it (see Annex C for a detailed list of the climate policies in force in Spain). To this end, the National Climate Change Adaptation Plan 2021-2030 was adopted in 2020. As a basic planning tool to promote coordinated action to address 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, agriculture and food. There is a synergistic flow that reinforces both plans, which is analysed in detail in Chapter 3.6.3.

Another key aspect of this process is to ensure that the implementation of the NECP is compatible with the territory and the conservation of biodiversity. When deploying the important renewable technology developments envisaged in this Plan, it is ensured in a responsible manner that **its natural heritage is preserved, in particular the protection of its biological diversity**, one of the highest and most valuable in Europe.

In accordance with environmental legislation, the Strategic Environmental Study (SEA) of the PNIEC 2021-2030, and its Strategic Environmental Declaration (EAD), includes 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 resulting from the implementation of the NECP, as well as in its follow-up.

In line with two documents, and in line with the provisions of the Law on Climate Change and Energy Transition in this case, **the State Strategic Plan for Natural Heritage and Biodiversity as at 2030**, as well as **the National Plan for Adaptation to Climate Change (2021-2030)**, among others, have various tools in place to ensure that actions linked to decarbonisation have a deployment compatible with the objectives of conservation and restoration of 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 public water resources** (DPH) and the status of water bodies. In particular, measures that may affect river systems will make planning for the sustainable use of water resources compatible with the **conservation of aquatic ecosystems**.

This National Plan is also complemented by the Circular Economy Strategy adopted in 2019, so that this updating process deepens the existing interlinkages between decarbonisation and the circular economy.

One of the most worrying risks for industry located in the European Union in relation to climate change policies is that these policies may harm their competitiveness if they increase their relative production costs and no equivalent measures are introduced in third countries. This risk of carbon leakage (shifting emissions to other regions) is higher for those emission-intensive sectors per unit of product and more open to global competition. The European Union, aware of this risk, provides that sectors considered to be at high risk of carbon leakage may be given special treatment to limit impacts on competitiveness. To this end, within the scope of the EU Emissions Trading System (EU ETS), a list of sectors at risk of carbon leakage has been established, receiving allowances free of charge, which significantly reduces their costs for participating in the EU ETS. In addition, lower energy costs due to the increased presence of renewable energies, together with the future carbon adjustment mechanism at the border, will help make European

industry more competitive.

Member States also have the possibility to compensate, through State aid schemes for electro-intensive sectors to compensate them for indirect costs associated with the passing-on of the allowance price to electricity. In this regard, the risk of carbon leakage is still recognised and Member States are allowed to take this measure to prevent this risk from materialising.

In addition to these measures (free allocation and indirect cost compensation), a new element, the Carbon Border Adjustment Mechanism (CBAM), has been introduced in the Fit for 55 package. This mechanism addresses the risk of carbon leakage stemming from the increased Union climate ambition, and is expected to also contribute to promoting decarbonisation in third countries. It is a mechanism that sets a carbon price for imports of certain carbon-intensive products that will be equivalent to what they would have been if they had been produced within the EU. To ensure a gradual transition from the current system of free allowances to the CBAM, the CBAM should be phased in as free allowances are phased out in sectors covered by the CBAM.

**The plan includes a gender perspective.** So far, there have been no specific studies on women's labour participation in the energy transition. However, recently the Institute for Just Transition has collaborated in the development of a specific report based on national statistics, which will allow to analyse the evolution of participation during the NECP framework until 2030. The study shows that in all occupations related to the energy transition, the participation of women in Spain is currently 18.2 %, compared to 47 % of the share in the total economy. This percentage is lower than in the economy as a whole and similar to that of industry as a whole. Women's participation on equal terms will be strengthened in the renewable energy sector, taking into account the competition between sectors of the economy to attract talent, the fact that the number of graduates or graduates in technical fields remains constant in Europe and the need for skilled labour for the implementation of the Plan. Although there are good news, such as the higher participation of women in the renewable sector than in fossil fuels or the lower pay gap than in the economy as a whole, there is a strong segmentation towards administrative versus technical activities.

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 and climate action, respectively), interactions with the other SDGs are important, as detailed in Annex E linking the actions foreseen in this Plan to the different Sustainable Development Goals.

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 in order to identify where the impact is most needed in order to achieve the overall decarbonisation objectives. In this regard, it is essential to have robust statistical data to serve as a basis for the projections that make up the prospective exercise. In line with this, this update process has relied on the latest available statistical data, and in particular on the 2021 energy balance. The energy balance is the most comprehensive statistical accounting of energy products and their flow into the economy and is reported annually to Eurostat in accordance with Commission Regulation (EU) 2022/132 of 28 January 2022 amending Regulation (EC) No 1099/2008 of the European Parliament and of the Council on energy statistics, as regards the implementation of updates of the annual, monthly and short-term monthly statistics. In addition, the macroeconomic assumptions have been updated with new projections in the model,

following the recommendations of the Commission Europe a38, and updating the economic growth path envisaged by the Ministry of Economic Affairs and Digital Transformation.

The following table summarises some of the elements included in the update of the NECP, in accordance with the process described in this section.

**Table 1.1. Process for updating the NECP**

	NECP	23 NECP
Energy balance	2017	2021
GDP path	2017	2022
Path CO2 prices and fuels	2017	2022
COVID-19 impact	0	0
Renewable Hydrogen Road Sheet	0	0
Self-consumption Road Sheet	0	0
Offshore Wind Road Sheet and Offshore Energy	0	0
Energy Storage Strategy	0	0
Biogás Route Sheet	0	0
Recovery, Transformation and Resilience Plan (PRTR)	0	0
Plan * SE	H	H
Pre-public consultation September 2022	0	0

In summary, the key factors that have shaped the process of updating the NECP have been the increase in climate ambition, progress on the measures set out in the previous document, the impact of the Recovery, Transformation and Resilience Plan, the developments in the Roadmap and Strategies of the Strategic Energy and Climate Framework, or the Plan + SE, among others, achieving the results and reflecting the following developments:

- Inclusion of 46 new measures to meet the objectives associated with the proposed amendment to European legislation, in the 'Fit for 55' and REPowerEU packages.
- Update of the macroeconomic assumptions with new projections, following the recommendations of the European Commission, and in line with the economic growth path envisaged by the Ministry of Economic Affairs and Digital Transformation, the latest statistical data have also been incorporated.
- Cross-cutting measures such as the gender perspective, the benefits of renewable generation in the territories, the Social Climate Fund or the Cohesion Policy have been incorporated.
- The measures contained in this Plan will achieve a reduction in emissions by 2030 of 32 % compared to 1990; 48 % of the total final energy consumed in 2030 shall be renewable, as well as 81 % of electricity generation
- **Renewable hydrogen** plays a leading role, with around 11 GW of electrolyzers, given its significant penetration in industry, which will be one of the key sectors to decarbonise.
- External dependence is drastically reduced by 22 points over the period, representing a reduction of 10 points compared to the previous NECP, so that, according to the plan, 49 % of primary energy will come from indigenous sources in 2030.
- Self-consumption becomes key to decarbonising end uses, with 19 GW installed in 2030, thanks to recent regulatory changes and the impetus of the PRTR, both of which are key

<sup>38</sup>Recommended parameters for reporting on GHG projections in 2023. Version after consultation of WG2 under the Climate Change Committee on 10 March 2022, sharing of draft remuneration on 30 March 2022 and consultation of National Experts designated by members of WG2 on 26 April 2022



factors in boosting energy storage, with 22 GW of daily, weekly and seasonal storage available in 2030.

- The electrification of the economy has been increased with measures covering applications in all sectors, and complementary decarbonisation measures have been included in hard-to-abate sectors such as industry, aviation and maritime transport, making use of advanced biofuels, as well as new renewable fuels such as green hydrogen.
- Energy efficiency in all sectors is increased again thanks to the PRTR, which will make it possible to implement energy efficiency plans in the industrial sector, as well as to increase the projected renovation of the existing housing stock, or improvements in mobility.

This will lead to annual economic growth of EUR 34.700 billion in 2030 and a net employment increase of 522.000 jobs in 2030.

## 1.2. 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 whole energy system and have been accompanied by a cyclical response from the various institutions and sectors. In the case of Spain, the More Energy Security Plan captures the relevant priorities and measures in this context.

**However, this economic framework overlaps with a structural one that is still fully in place.** In this regard, the Paris Agreement reached in 2015, which aims to keep the increase in the global average temperature below 2 °C<sup>39</sup> above the levels existing before the industrial revolution, and to make efforts to limit it to 1.5 °C. However, the conclusions of the mitigation report of the Sixth Assessment Cycle of the Intergovernmental Panel on Climate Change (IPCC) note that the implementation of the policies implemented at 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 fairness, social justice, inclusion and just transition processes and recalls that early action on climate change provides both short- and long-term benefits.

As a coherent response to short-term and structural medium and long term challenges, the European Union has put forward an update of the regulatory and policy framework for 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.

### 1.2.1. Energy and Climate in the European Union

In December 2019, the European Union updated its 2030 climate and energy policy commitment, adopted by the European Council in October 2014, which included a target of reducing greenhouse gas emissions by 40 % below 1990 levels, **increasing it to a 55 % decrease**. These commitments were designed in line with the above-mentioned Paris Agreement, and with the objective of reaching climate neutrality for the European Union by 2050, both objectives being enshrined in the European Climate Law, providing a framework for advancing efforts to mitigate

---

<sup>39</sup>Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the IPCC Sixth Assessment Report.

and adapt to the impacts of climate change.

What started as a vision to make the European Union the first continent to achieve climate neutrality by 2050 has become the most comprehensive set of regulations in the world 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 European Commission presented the 'Fit for 55' legislative package setting out a thorough revision of the directives and regulations that make up the current 'Clean Energy for all Europeans' package, addressing the reforms needed to achieve this new EU emissions reduction target for 2030.

More recently, in May 2022, in response to the difficulties and global energy market disruptions caused by the Russian invasion of Ukraine, in May 2022 the Commission presented the 'REPowerEU Plan'<sup>40</sup>, a plan to rapidly reduce dependence on Russian fossil fuels and advance the green transition, reinforcing certain objectives and measures to achieve them. In particular, this plan strengthens the diversification of gas supply sources to Europe, the electrification of the energy system and the transformation of the energy-intensive industry. Research and innovation remains key to accelerating 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. The current proposal for these legislative packages<sup>41</sup> includes as European targets for 2030, complementary to the overall emission reduction target, reaching 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 2007 baseline. In addition, this process of negotiations has led to an increase in the ambition of a number of sectoral objectives that support and contribute to achieving these major objectives, as reflected in the proposals for directives and regulations that make up this package.

### 1.2.2. Main regulatory changes since the preparation of the current NECP

The period following the preparation of the current NECP has been marked by profound transformations in the energy system, first of all by the COVID-19 pandemic and its effects on the energy mix and economic activity, and in the last two years by the energy crisis, which started in summer 2021 with the reduction in Russian gas supply 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 under **the National Plan to respond to the economic and social consequences of the war in Ukraine**.

Most of these actions have been part of the **More Energy Security Plan (+ SE)**. These include the adoption in June 2022 of the **Iberian mechanism** to decouple the price of natural gas from the electricity market, which 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 fiscal and regulatory measures set out in *Royal Decree-Law 6/2022 of 29 March 2007 and Royal Decree-Law 11/2022 of 25 June 2007*, as well as in the following rules that have extended many of the aforementioned tools. These regulatory

---

<sup>40</sup>[https://ec.europa.eu/commission/presscorner/detail/en/ip\\_22\\_3131](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131)

<sup>41</sup>This legislative package is not adopted at the time of drafting this document. These objectives reflect the agreements resulting from the negotiation in the European institutions at the time of drafting this document.

tools aim to reduce the impact of rising 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 %, a reduction of charges by 55 % compared to 1 June 2021 and a reduction of 80 % for tolls for the electrointensive industry, a ban on cutting off the supply of light, gas and water to vulnerable consumers, the cap on butane bottle, the reduction in fuel prices and the relaxation of natural gas contracts to industry. In addition, *Royal Decree-Law 18/2022 of 18 October 2014* limited the Last Appeal Tariff for natural gas for families and SMEs and created a new Last Appeal Tariff for EU citizens.

During this stage, the scope of the measures to protect vulnerable consumers has also been broadened by the creation, by means of *Royal Decree-Law 17/2021 of 14 September 2007*, of a Minimum Vital Supply that guarantees minimum comfort conditions for the beneficiaries of the social voucher, and by strengthening this benefit through *Royal Decree-Law 6/2022 of 29 March*, through the extension of the income thresholds for access to the status of vulnerable consumer, the reduction of the maximum period for the resolution of applications, the automatic renewal of the voucher and the strengthening of guarantees. Furthermore, *Royal Decree-Law 18/2022 of 18 October* extended the discount on the electricity social bond for severe vulnerable and vulnerable consumers to 65 % and 80 % respectively, and doubled the aid for the social thermal bond.

In addition, measures of a structural nature have been implemented to accelerate renewable deployment and strengthen security of supply. Following the approval of the new renewable energy economic scheme for electricity generation installations and the establishment of an indicative timetable for the period 2020-2025, four auctions have been held and awarded 6.380 MW.

Measures to facilitate renewable deployment and self-consumption have also been adopted, in line with those taken at European level through REPowerEU. Specifically, *Royal Decree-Law 23/2020 of 23 June 2014* simplified and speeded up the processing of renewable projects and the associated electricity infrastructure, removing barriers to their implementation.

The processing of self-consumption facilities was also speeded up. By means of Order TED/1247/2021 on variable allocation coefficients, the allocation of energy generated in collective self-consumption was optimised by allowing the voluntary transition from fixed to variable sharing coefficients. In addition, *Royal Decree-Law 29/2021 of 21 December* allowed the connection of installations via a network at any voltage level and exempted self-consumption installations with excess power of not more than 100 kW from providing the guarantees required during the access and connection process.

In addition, *Royal Decree-Law 6/2022 of 29 March 2009* freed up 10 % of the capacity of the transmission network reserved for the performance of access tenders and amended the rules so that, in the planned capacity tenders, all or part of the capacity to be launched may be used exclusively for self-consumption generating installations.

These measures have been supplemented by extending the maximum distance between generation installations and consumption points to 2 km, and the minimum period of residence in each type of self-consumption (with or without surpluses) has been reduced from 1 year to 4 months. The *Royal Decree* regulating the two legal forms 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 energy 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 2007 approved the general framework of the 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.

### **1.2.3. 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 framed as a structuring framework for such policies and measures, which have been developed in line with the Plan.

#### **Decarbonisation of the economy**

In line with the international context and European energy and climate policies, in recent years Spain has made profound amendments in order to bring the regulatory and policy framework in line with international commitments in this area. In this regard, it is worth highlighting the ratification of the Paris Agreement in 2017 or the actions to implement the 2030 Agenda for Sustainable Development in Spain.

In line with this, the Spanish Government has developed the Strategic Energy and Climate Framework, which contains a number of strategic and legislative elements aimed at identifying the main lines of action on the path towards climate neutrality. One of the key elements of this framework is Law 7/2021 of 20 May 2020 on climate change and 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 on climate change and energy transition responds to Spain's international and European commitment and presents an opportunity from an economic and modernisation point of view, as well as from a social point of view, facilitating the fair distribution of wealth in the decarbonisation process. In this way, the law puts at the heart of political action the fight against climate change and the energy transition, as a key vector of the economy and society to build the future and generate new socio-economic opportunities. 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 on climate change and energy transition puts the fight against climate change and energy transition at the centre of political action for the first time, as key vectors of the economy and society. This law is the result of a science-based process of drafting, which is very working, highly involved and charged with the demands of Spanish society as a whole, which prepares us to respond in an ambitious manner 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 sets out 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 complete in new markets, our social fabric, how to facilitate a fair distribution of wealth in the decarbonisation process with social justice and a just transition, how to attract investments in the technologies of the future, or how to avoid financial risks to the country and to our companies and financial institutions, among many other aspects.

The law therefore facilitates the stability and predictability necessary to avoid cost overruns or the generation of captive assets, which could hamper the progress of our economy over decades, minimising negative impacts, both social and ecosystem. 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 the integration of renewable energy into our electricity grid, clean mobility, healthy air, more liveable cities, green agriculture and diet, boost rural Spain and value the conservation of nature and biodiversity, our coast and water, or strengthen public health, education and participation in decision-making processes.

To this end, it sets ambitious targets by putting our country at the forefront of the new model of decarbonised 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 generate a framework of confidence in the direction that the country must take, in terms of investment, 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 Climate Change and Energy Transition Law identifies as planning instruments to address the energy transition to the NECP and the Long-Term Decarbonisation Strategy (LTS). While the NECP sets out the decarbonisation path in this first decade, the Long Term Decarbonisation Strategy extends this path to climate neutrality by 2050, a scenario in which greenhouse gas emissions will be compensated by sinks.

### **The Long-Term Decarbonisation Strategy**

The transition from the LFS will enable Spain to reduce its greenhouse gas (GHG) emissions by 90 % compared to 1990 levels by 2050, which means achieving climate neutrality. The remaining 10 % shall be absorbed by sinks.

Based on the scientific and technical knowledge available, and with a technology-neutral approach, LFS provides 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 the potential positive effects on economic development, employment, human health and the environment. This is therefore a strategic analysis of options to decarbonise the economy 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 renewable energy and energy savings and efficiency, as well as at sectoral level. In addition, it addresses the role of carbon sinks to offset emissions that cannot be avoided, while at the same time helping to safeguard biodiversity.

The trajectory of the LTS will make it possible to change the energy paradigm, putting the energy system base on renewable energy by mid-century, which will transform and increase the competitiveness of the Spanish economy, while improving citizens' health and quality of life.

In addition, the path to climate neutrality is crossed by multiple factors that are cross-cutting to the green transition and are also addressed by the LFS. Citizens will take their traditional role at the heart of this change, with a particular focus on vulnerable groups and sectors, as well as those living in Just Transition areas, generating sustainable employment opportunities, especially in the rural environment, while also addressing the demographic challenge. This strategy also integrates a gender perspective with a gender equality approach. In addition, it has multiple synergies with the United Nations Sustainable Development Goals. Another major dimension addressed in LFS, in addition to mitigation, is adaptation, in response to the need to address the challenge of managing risks and reducing vulnerability to current and future climate changes in Spain.

The transition towards climate neutrality presents multiple opportunities for our industry, by developing strategic sectors such as renewables, green hydrogen and energy storage along their entire value chain. The deployment of these technologies will also contribute to energy self-sufficiency and resource efficiency, which will lead to environmental care and increased resilience to climate change. The new transformations will take place 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 employment opportunities.

Thanks to the implementation of the LFS, the following results are expected:

- Economic growth is decoupled from final energy consumption. GDP produced per unit of final energy consumption is multiplied by 2,5 (between 2017 and 2050).
- Primary energy consumption is reduced by 40 %, thanks to energy efficiency policies, changes in habits and the circular economy, resulting in a reduction of more than 30 % in final energy consumption.
- The contribution of renewables to final energy will be almost 100 % (97 %) in 2050. The electricity sector will be 100 % renewable, while the contribution of renewable energy to transport and mobility will reach 79 %, reaching 97 % in the heating and cooling sector.
- External energy dependency is reduced from 73 % in 2018 to around 13 % in 2050, resulting in savings in the trade balance of EUR 344.000 billion.
- By sector, mobility and transport will reduce their emissions by close to 98 % compared to current values, industry by more than 90 %, agriculture and waste around 60 %, and the building sector will be 100 % decarbonised by 2050.
- From 334 million tonnes of CO<sub>2</sub> equivalent (MtCO<sub>2</sub> eq) from 2018 to a maximum of 29 MtCO<sub>2</sub>eq in 2050. To reach climate neutrality, the remaining 10 % will be absorbed by carbon sinks (forests, wetlands, etc.), which will be able to store about 37 MtCO<sub>2</sub>eq.
- The role of carbon sinks will be strengthened through reforestation of 20.000 hectares per year between 2020 and 2050, a 4 % increase in the area of forest land, improved forest management and the restoration and restoration of 50.000 hectares of wetlands until 2050.

- In addition, the implementation of the LFS will lead to a significant improvement in air quality and biodiversity conservation, with a potential decrease of over 60 % in the number of premature deaths in 2050 compared to 2010.

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

Existing policies and measures, at national level, adopted or implemented to date on decarbonisation or with an impact on GHG reduction, are spread across different sectors and departments, and the list detailed in Annex C can be found. 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 the projects promoted through the **Carbon Fund for a Sustainable Economy (FES-CO<sub>2</sub>)** and designed to set a path towards 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. The creation of a tax on fluorinated gases, which has enabled a rapid transformation of this sector by drastically reducing its emissions, is also noteworthy.

As regards the sectors subject to emissions trading, the European scheme is governed by Law 1/2005 of 9 March 2007 and by various Royal Decrees implementing it. This scheme affects around **900 industrial and electricity generation installations in Spain**. Our country is also entrusted with the management of more than 30 active aircraft operators, of which about half are foreign nationals.

For its part, the electricity sector is one of the cornerstones of this process of decarbonising the economy. Renewables will be an undisputed player in their transformation. In this regard, the IPCC notes that the costs and deployment of renewable technologies for decarbonisation are rapidly transforming. By way of example, between 2010 and 2019 there have been substantial reductions in unit costs for solar (85 %), wind (55 %) and lithium-ion batteries (85 %), as well as sharp 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 of the sector and with a view to contributing 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 the field of energy 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 such as energy storage, renewable energy communities, demand-side management, aggregators or hybridisation, as well as measures to boost high-capacity charging infrastructure, or measures aimed at improving and simplifying, inter alia, authorisation procedures for the construction, extension, modification and operation of electricity production, transmission and distribution facilities. In addition, in order to boost R & D & I in the sector, it introduced simplified authorisation procedures for R & D & I projects, or the form of regulatory test banks, which was subsequently developed through 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 2007 regulating the Economic Regime for Renewable Energy for Electric Power Production Facilities provides for the launch of calls for tenders for the award of the economic regime through competitive tendering procedures. Following the approval of the new renewable energy economic scheme for electricity generation installations and the establishment of an indicative timetable for the period 2020-2025, four auctions have been held which have awarded 6.380 MW.

Another key element in organising the deployment of renewable energy needed in this energy transition process is Royal Decree 1183/2020 of 29 December 2006 on access to and connection to electricity transmission and distribution networks, the purpose of which is to establish the principles and criteria for applying for, processing and granting permits for access to and connection to electricity transmission and distribution networks.

On the other hand, **the implementation of measures on self-consumption has led to an exponential growth of 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 granted under Royal Decree 477/2021 of 29 June 2007 on incentive programmes linked to self-consumption and storage, using renewable energy sources, as well as the introduction of renewable thermal systems in the residential sector, have been key to this drive, as part of the Recovery, Transformation and Resilience Plan.

With regard to the promotion of the use of biofuels, its most recent impetus was given at the end of 2015 (Royal Decree 1085/2015 of 4 December on the promotion of biofuels) through new mandatory minimum annual sales or consumption targets. Obligated persons can reach them flexibly by means of biofuel certificates on diesel or petrol without distinction. Recently, at 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). This Royal Decree also sets targets for the energy content of advanced biofuels and biogas until 2030: 0.1 % as an indication for the years 2020 and 2021 and, on a mandatory basis, at least 0.2 % in 2022, 1 % in 2025 and 3.5 % in 2030.

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

Finally, it should be noted that **two agreements** for the coal sector with trade unions and companies were reached among recent initiatives to decarbonise the economy: 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 Areas for the period 2019-2027*, and one related to the closure of coal-fired thermal power stations, the *Agreement for a Just Energy Transition for closed thermal power stations*, which included the plants of 3 companies in 2020 and those of an additional company in 2021, thus incorporating all coal power plants in Spain. Just Transition Agreements have also been developed in the affected areas to support new business and industrial initiatives, local social and environmental infrastructure, aid for workers and environmental mine restoration works. Thus, projects supported by aid granted or agreements reached on May 2023 will create a volume of employment similar to that at the closure plants, as implemented, although this distribution is not the same among all the areas concerned.

## Energy efficiency

Measures to promote energy efficiency comprise a range of actions of a legislative or financial



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

The FNEE, headed by its Monitoring and Control Committee, an inter-departmental body in which the main ministries with competence in this area are represented, is managed by the IDAE. Its purpose is to finance 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 the national energy efficiency obligation scheme. This Fund articulates efficiency measures through calls for support programmes.

For this new period, the period of validity of this system has been extended: Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and in other areas for economic recovery **extends the validity of the SNOEE until 31 December 2030**, in accordance with the provisions of Directive (EU) 2018/2002 amending the Energy Efficiency Directive.

More recently, also within the framework of the SNOEE, and for this new obligation period 2021-2030, Royal Decree 36/2023 of 24 January establishing a system of Energy Saving Certificates, the CAE System, was approved, a new system that 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 goods, on the other. The main driver of a more sustainable and energy-efficient transport system is the Mobility Strategy of MITMA. Actions to improve the energy efficiency of buildings have been part of the **long-term strategy for energy renovation in the building sector in Spain (ERESEE)**, which has various pieces of legislation. This is the case with the Technical Building Code 42 (CTE), the Regulation on Thermal Installations in Buildings<sup>43</sup> (RITE) or the Energy Certification System for Buildings, <sup>44</sup> among others. The ERESEE is currently in the process of being updated as part of the mandatory review included in the Energy Efficiency in Buildings Directive (2010/31/EU). In addition, both ETC and RITE have been updated due, on the one hand, to their natural review every five years and, on the other hand, to include the new requirements resulting from the updates of the Energy Efficiency Directive (2012/27/EU) and the Energy Efficiency in Buildings Directive (2010/31/EU).

Within the building sector, support for renovation in Spain is mainly based on the PRTR aid programmes, which are complemented by the FNEE and ERDF funds. Component 2 of the Plan, led by the Ministry of Transport, Mobility and the Urban Agenda (MITMA), includes all programmes financed by NextGenerationEU funds as part of the Housing Rehabilitation and Urban Regeneration Plan.

This component of the PRTR includes the aid programme for the comprehensive renovation of residential buildings and dwellings, which aims to boost the renovation of residential buildings,

---

<sup>42</sup>Royal Decree 314/2006 of 17 March, by which the Technical Building Code was approved.

<sup>43</sup>Royal Decree 1027/2007 of 20 July 2015, updated by Royal Decree 238/2013 of 5 April 2009 amending certain articles and technical instructions of the RITE.

<sup>44</sup>Royal Decree 235/2013 of 5 April 2007 approving the basic procedure for the certification of the energy performance of buildings.

dwellings and neighbourhoods.

Similarly, component 2 of the PRTR includes the Programme of Aid 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 continue the programmes, PAREER-CRECE and PAREER II.

The basis for public support shall be the energy performance certificate of the building, which should contain a description of the energy characteristics of the building as a starting point for an energy diagnosis. This certificate shall contain information on all energy elements (thermal envelope, thermal heating installations, 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 those modes least energy-consuming per passenger-km or tonne-km, the use of information and communication technologies (ICT) being one of the pillars for promoting new mobility services. In addition, they included actions aimed at improving the efficiency of the fleet of rolling stock through fleet renewal, the gradual incorporation of electric vehicles and other technological developments, as well as actions aimed at the efficient use of means of transport. Article 14 (3) of the Law on Climate Change and Energy Transition highlights the development of sustainable urban mobility plans for municipalities with more than 50.000 inhabitants, island territories and municipalities with more than 20.000 inhabitants that exceed the limit values for pollutants regulated. 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.

For its part, energy efficiency in non-urban environments, and thus in sectors other than buildings or transport, has benefited from support measures tailored to the specificities of each sector. In industry, a policy of financial support for industrial investment has prevailed as part of the public policy of promoting competitiveness; support programmes have been promoted for SMEs and large companies which, financed from the NEEF budget, have as their main objective to facilitate the implementation of energy saving and efficiency measures, while incentivising and promoting the implementation of actions in the industrial sector that reduce carbon dioxide emissions. Programmes have also been carried out for agricultural installations under the FNEE and the PRTR. In addition, in January 2023, the Energy Saving Certificates System (PPA) was launched, which is expected to have a significant impact on improving energy intensity in the sectors using final energy.

### **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, high (and growing) renewable generation means that external energy dependency is decreasing, while the Spanish electricity system shows higher levels of security of supply than neighbouring countries. As regards international flows, Spain has electricity interconnections with France, Portugal and Morocco. In the energy context of last 2022,

interconnection capacity contributed to France's security of supply, in a context of high unavailability of its nuclear power plant, with more than half of the installed power unavailable for several months. However, it is necessary to continue to strengthen interconnection capacity in line with the objectives agreed at European level, both to facilitate further renewable integration and to contribute to a strengthening of security of supply.

In the area of natural gas, the security of supply in Spain is high for a number of reasons, notably high entry, transmission and storage capacity, as well as the flexibility of the import capacity of Licuado Natural Gas (LNG). Thus, in 2021, 46 % of imports were made via pipelines, compared with 54 % for methane vessels (in the form of Liquefied Natural Gas through regasification plants). Today, the most relevant international gas pipelines are Maghreb (Maghreb – Europe) and Medgaz (Singaporia-Almería) and interconnections with France and Portugal. In addition, the Spanish regulatory framework requires a certain diversification of natural gas supply sources, which reduces vulnerability. The breakdown by country of origin of imports of natural gas in 2021 was as follows:

- Algeria (43 %)
- United States (15 %)
- Nigeria (12 %)
- Russia (9 %)
- Qatar (6 %)
- France (5 %)
- Others (10 %)

As regards petroleum products, Spain has a good diversification in terms of the basket of imported raw materials. The main oil source countries in 2021 were as follows, where no country accounted for more than 20 % of imports:

- Nigeria (18 %)
- Mexico (14 %)
- Libya (11 %)

In addition, the 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. In this way, Spanish refineries are prepared to process different types of raw material and origin. Finally, Spain has an extensive pipeline network owned by Exolum, which facilitates the full distribution of petroleum products and, in particular, reserves throughout 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 needs to reduce significantly its external energy dependency from 73 % in 2019, which will be reduced to 51 % as a result of the measures provided for in this plan.

In the most recent context, in view of the increasing geopolitical tensions and markets, the above-mentioned Plan + SE has been articulated in order to provide more security against energy prices for households and the Spanish 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 the protection of vulnerable consumers**, households and businesses; strengthening **strategic and energy autonomy**; and to strengthen **solidarity** with other Member States. Given their impact and contribution to the five dimensions foreseen in the NECP: decarbonisation, efficiency, energy security, internal market and competitiveness, the impact of this Plan is

incorporated in this update.

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

The Plan + SE has stepped up and strengthened public-private partnerships with the various energy operators, a task that has been coordinated by the Cyber Coordination Office (OCC) of the National Centre for Critical Infrastructure and Cybersecurity Protection (CNPIC). Similarly, the designated critical 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 the threats and challenges to critical infrastructure in the energy sector and in the nuclear industry, updating the information contained in those plans.

### **Internal Energy Market: interconnectivity, infrastructure and market**

A well-designed market is an essential factor in enabling the incorporation of renewable energy into the system. 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 June 2019 on the internal market respond to the creation of a market framework that rewards flexibility and innovation, with the fundamental aim of ensuring a supply of electricity that is accessible to all. These rules govern current electricity markets, ensuring that they are truly integrated, consumer-centred, flexible, fair and transparent competitive 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 a **proposal to reform the electricity market**, which it presented in March 2023, 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 have an affordable price, for investors to be certain and to keep Europe competitive, preparing the market for current and future premises, renewable technologies, storage and demand management.

As regards electricity transmission infrastructure, the Electricity **Transmission Network Development Plan 2021-2026 includes the** infrastructure necessary to ensure security of supply in the planning horizon by 2026. The future network development plan is governed by the guiding principles set out in Order 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, compatibility with environmental and technical constraints, maximising the use of the existing grid, complying with the principles of 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 objectives 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 in electricity infrastructure planned for 2026 is EUR 4.554 billion, with an average annual investment volume of EUR 759 billion.

In relation to cross-border electricity interconnections, the degree of electricity interconnection between Spain and France is less than 3 % of the installed electricity generation capacity in Spain,

and is well below the objectives of the Energy Union: **10 % of installed electricity generation capacity for all Member States by 2020 and 15 % by 2030**, so it will be necessary to further develop new interconnections.

In this direction, and within the framework of cooperation initiated at the Madrid Summit of 2015, an increase in interconnection capacity with France is planned following the following enlargements:

- Interconnection between Aquitaine (FR) and the Basque Country (ES), by means of a submarine cable along the Bay of Biscay, which will allow interconnection capacity between Spain and France to reach 5.000 MW.
- Interconnection between Aragón (ES) and Pyrénées-Atlantiques (FR) and interconnection between Navarra (ES) and Landas (FR), which will increase the interconnection capacity between Spain and France to 8.000 MW.

The future planning of natural gas transmission infrastructure will be carried out once the updating of the regulation of the hydrocarbon sector has been approved, taking into account new developments arising from the update of Community legislation, in particular the revision of the Regulation and the Hydrogen and Natural Gas Directive. To date, the basic regulation has been 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 document is the Electricity and Gas Sector Planning 2008-2016, approved on 30 May 2008 by the Agreement of the Council of Ministers. In this current planning, the need for new transport capacity, storage and regasification infrastructure is analysed and identified, drawing the main axes in such a way that a safe and flexible system is configured, in which all gas areas are connected.

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 natural gas, **energy regulators should be able to take decisions on all relevant regulatory issues and be independent of any other public or private interest**. The European framework provides 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 to their own data by consumers.

### **Research, Innovation and Competitiveness**

The MCIN is the department of the General State Administration responsible for proposing and implementing policy on scientific research, technological development and innovation 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 R & D & I actions in these areas and other actors involved.

The policy framework for research, development and innovation is defined in two key documents: **the Spanish Strategy for Science, Technology and Innovation 2021-2027 (EECTI) and the State Plans implementing it, the State Plan for Scientific, Technical and Innovation Research 2021-2023 (PEICTI) is currently in force**.

EECTI 2021-2027 is the basic instrument for consolidating and strengthening the Science, Technology and Innovation System (SECTI) in Spain over the next seven years. It is specifically designed to facilitate the articulation of national R & D & I policies with the policies of the European Union, aligning its objectives with those set by the EU in the framework programme for

funding R & D & I activities, **Horizon Europe** for the period 2021-2027, helping to incentivise the active participation of **SECTI** actors in the European space. It also includes coordination between the activities of the General State Administration, the Autonomous Communities and the European Union, while proposing efficient mechanisms for the coordination of SECTI staff.

R & D & I and industry should be at the heart of the initiatives and approaches proposed by the national public and private sectors, and it is in this respect that EECTI has a strong emphasis on the need to bring science closer to economic and social progress, in order to serve the **EU's 2030 Agenda and policy priorities**. To achieve this objective, the Strategy prioritises and responds 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. **National strategic sectors** embedded in EECTI include, inter alia, **climate, energy and mobility: climate change, decarbonisation, mobility and sustainability**.

The State plans for scientific and technical research and innovation are the central tool of the AGE for the development and achievement of the objectives of EECTI. The PEICTI 2021-2023 is structured into four State Programmes: 1. Addressing the priorities of our environment; 2. Boosting scientific and technical research and its transfer; 3. Develop, attract and retain talent; 4. Catalyse innovation and business leadership. Within the State Programme to address the priorities of our neighbourhood, the **State Sub-Programme for Strategic Actions**, which sets out the strategic lines, is incorporated into six thematic groupings, including **AE5. Climate, energy and mobility**.

In addition, in the framework of the 2021-2027 Association Agreement between Spain and the European Union, which sets out the strategic lines and investment priorities of the Structural Funds for the period 2021-2027, the EECTI 2021-2027, together with the State Plans for Scientific, Technical and Innovation Research, is set out as the **State Smart Specialisation Strategy S3**, which contains the elements necessary for compliance with the enabling condition. In addition, EECTI covers the **Regional S3 Smart Specialisation Strategies** whose interaction is coordinated through the Science, Technology and Innovation Policy Council (CPCTI) and the Network of Public Policies for R & D & I (REDIDI). In this context, the **S3P-Energy Energy Platform**, set up by the European Commission, is a tool to support the implementation of **Smart Energy Specialisation Strategies** of regions and countries that include energy-related thematic priorities, in particular as regards energy innovation activities at national, regional and local (sub) levels. This platform also connects and gives visibility to the different national and regional priorities and strategies by facilitating cooperation and avoiding the atomisation of efforts. Currently, S3P-Energy incorporates six interregional partnerships on Bioenergy, Geothermal Energy, Offshore Renewable Energy, Smart Networks, Solar Energy and Sustainable Buildings.

With regard to cooperation at national level, it highlights the role of the **Spanish Technology Platforms**, which are industry-led team-work forums, comprising all SECTI actors (companies, technology centres, public research organisations, 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 & C route.

In the field of energy, the **ALINNE initiative should be highlighted**. It is a not-for-profit energy initiative that is launched to bring together and coordinate efforts between all actors in the energy R & I & C value chain in the face of key energy challenges, contributing to the definition of working patterns at national and European positioning level. ALINNE is supported by the Spanish Technology Platforms in the field of energy and therefore presents an extensive capacity map including Energy Efficiency, Biomass, Wind Energy, Solar Concentration, Lower Temperature

Solar, Photovoltaic, Geothermal, Hydrogen and Piles, Intelligent Networks, Energy Energy, Energy Storage Systems, as well as CO<sub>2</sub> Storage and Capture.

In addition, EECTI and PEICTI are complemented by sectoral policies. In this regard, in addition to integrating the lines of action in R & D & I of this Plan, coordination is established with the Long-Term Decarbonisation 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 the Marine Wind and Marine Energy in Spain, the Biogás Roadmap, the Secure, Sustainable and Connected Mobility Strategy 2030, the Self-Consumption Roadmap or the Long-term Strategy for Energy Renovation in the Building Sector in Spain, among others.

In addition, 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 strengthening of SECTI capacities, technology and innovation”**. The aim of this component is to undertake institutional reform and strengthen the capacities of the SECTI in order 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 RDI in a sustainable manner and in strategic areas to reach the European average by 2027. One of the reforms implemented has been **the amendment of the Law on Science, Technology and Innovation, through Law 17/2022**, with three key axes: 1. Improve governance and coordination of SECTI; 2. Achieving an attractive and stable scientific career in order to retain scientific talent; 3. Strengthen the transfer of research results to society.

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

Under the PRTR, as explained above, the concept of PERTE (Strategic Projects for Recovery and Economic Transformation) is also created as public-private partnership instruments in which the various public administrations, businesses and research centres collaborate. Its aim is to promote major initiatives that make a clear contribution to the transformation of the Spanish economy and are aimed at permanence and with the intention of going beyond the time frame of the PRTR. So far 12 strategic projects have been approved, including for their particular energy and climate link the **PERTE for renewable energy, renewable hydrogen and storage (EHRA), the PERTE for electric and connected vehicle development (ECV), and the industrial decarbonisation PERTE**. In both strategic projects, actions to promote R & I + c are included. Other PERTE also include R & D & I actions linked to energy and climate, such as agri-food, circular economy, marine industry, aerospace and digitalising the water cycle.

In addition, the More Energy Security Plan (+ SE) provides for a series of measures to support the energy transition value chain, including the acceleration and extension of the financial envelope of the ERHA PERTE and the development of a new PERTE for the decarbonisation of the industry in order to improve the competitiveness and reduce the energy costs of the manufacturing sector.

Within the European framework, Spain is undergoing an energy transformation that, while effective in terms of costs, makes it possible to meet the European objectives of reducing GHG emissions and decarbonising the economy, as provided for in the Green Deal.

European, the ‘European Climate Law’ and taking into account the ‘New Industrial Strategy for Europe’ strategy, which ensures the importance of R & D & I in improving and boosting the competitiveness of European industry.

On the other hand, the **SET-Plan**, which places research, innovation and the deployment of low-carbon energy technologies as a key pillar for accelerating the energy transition, has a leading role and is included in the fifth dimension of the Energy Union in the area of research, innovation and competitiveness, which remains so far. The update of the SET-Plan, which is currently under way, will align it with the objectives of the European Green Deal and the new European energy policy context, by reviewing policy objectives and targets for the development of innovative clean energy solutions and their deployment, as well as aligning national and European research and innovation resources.

Spain actively participates in various transnational **technology collaboration programmes**, including Horizon Europe, Eureka, Bilateral Cooperation Programmes, PRIMA, Innovative SME Part-Eurostars 3, European Partnerships (in particular the Partnerships Co-Fund CET-technologies for clean energy transition and DUT-technologies and innovative solutions for urban transition).

## 2. GENERAL AND SPECIFIC OBJECTIVES

The policies and measures included in this update of the NECP 2023-2030 represent an increase of ambition compared to 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 provided for in the previous section are some of the levers that have pushed 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 2021-2030 NECP and the document updated**

		Results in 2030	
		2020 NECP	2023 NECP
General	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 %	– 43 %
	Share of renewables in electricity generation	74 %	81 %
	Number of electric vehicles	5 million	5,5 million
	Number of dwellings renovated	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 %	– 42 %



	<b>Energy efficiency Reduction of final energy consumption</b>	— 41.7 %	— 44 %
	<b>Energy dependency</b>	61 %	51 %
<b>Transport</b>	<b>Reduction of transport GHG emissions intensity</b>	—	— 16.6 %
	<b>Share of renewables in the transport sector</b>	15 % *	25 %
	<b>Combined percentage of RFNBO<sup>45</sup> + Advanced Bids and biogas in Annex IX Part A</b>	2.1 %	11 %
<b>Industry</b>	<b>Annual increase in renewable energy in industry</b>	1.1 %	5.1 %
	<b>Share of RFNBO on hydrogen in industry</b>	25 % * *	74 %
<b>Building, cooling heating</b>	<b>Final energy from renewables in buildings</b>	—	73 %
	<b>Annual increase in renewable percentage of heating and cooling</b>	0.83 % (2021-2025) 1.19 % (2026-2030)	1.27 % (2021-2025) 2.07 % (2026-2030)

\* In the amendment to the Renewable Energy Directive, a change in the methodology for calculating this term has been established, so that the 28 % established in the previous NECP is 15 %.

\* \* renewable Hydrogen Road Sheet

Source: Ministry for the Ecological Transition and the Demographic Challenge, 2023 The update scenario is the result of implementing the policies and measures included in section 3 of this document in the energy system model described in Annex B. Following the optimisation carried out by the TIMES-Sinergia model, a scenario is obtained which coincides with the cost-effective solution for the implementation of these measures and the existing contour conditions. In this way, the model works in a space of solutions where measures are interlinked with each 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 different measures, which are addressed as a whole, are inseparable, interlinked with each other and creating positive synergies that allow several objectives to be achieved simultaneously.

## 2.1. DECARBONISATION DIMENSION

As stated above, Spain's long-term objective is to become a **carbon-neutral country by 2050** (net-zero GHG emissions), which requires at least 90 % mitigation of total gross GHG emissions compared to base year 1990. As an intermediate milestone in this direction, and as a result of the measures provided for in this Plan, **the 309,8 MtCO<sub>2</sub>eq emitted in 2019 will be increased to 194,6 MtCO<sub>2</sub>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 further reduce their emissions in this period are as follows:

**Table 2.2. Evolution of emissions (thousand tonnes of CO<sub>2</sub> equivalent)**

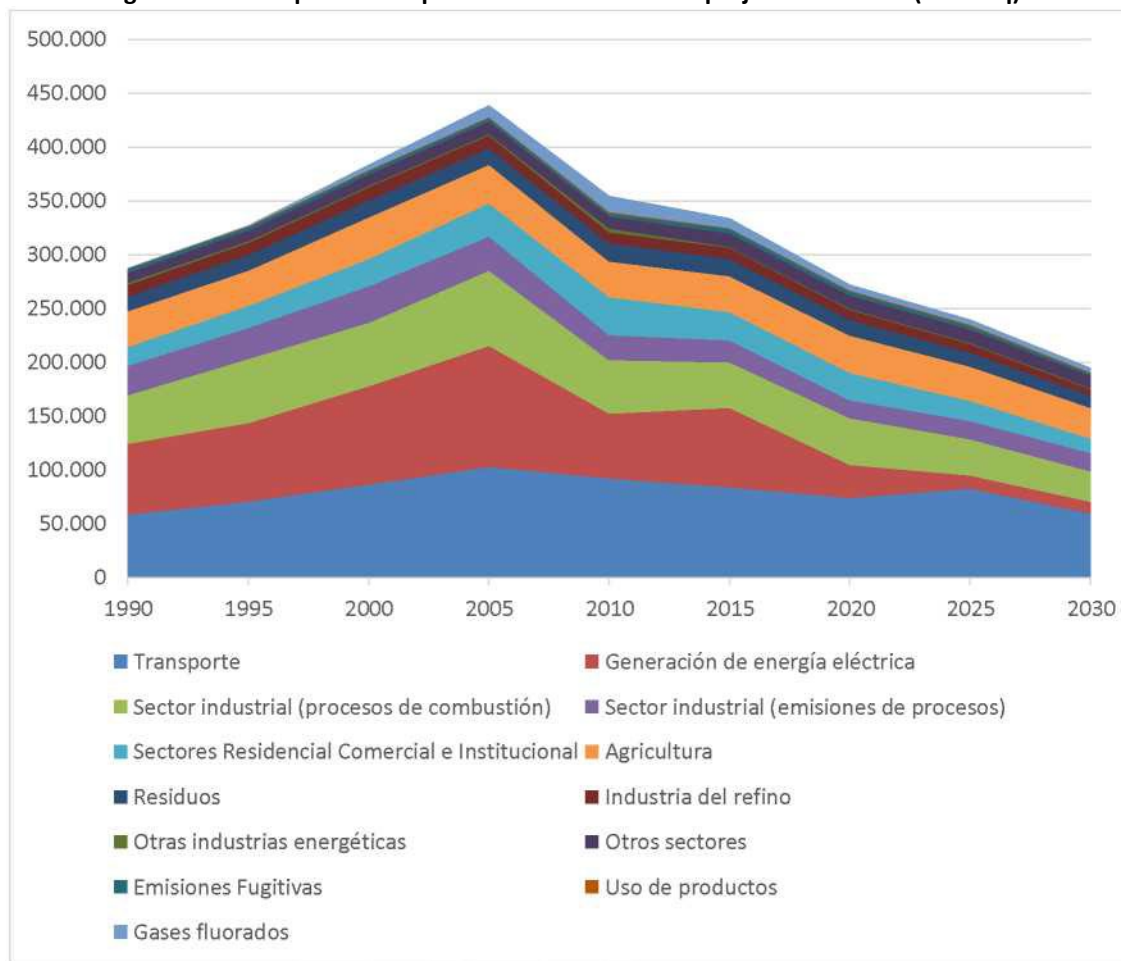
Emissions projection in the PNIEC 2023-2030 scenario (MtCO <sub>2</sub> eq)							
Years	2005	2010	2015	2019	2020	2025 *	2030 *
<b>Transport</b>	102.840	91.916	83.746	91.426	73.873	82.554	59.424
<b>Production of electricity</b>	112.781	60.460	74.109	44.045	30.766	12.152	10.891
<b>Industrial sector (combustion processes)</b>	69.884	49.845	42.194	46.925	43.572	34.035	28.541
<b>Industrial sector (process emissions)</b>	31.509	23.287	20.591	18.535	16.897	16.844	16.810
<b>Residential sectors Commercial and institutional</b>	30.926	35.181	26.117	25.589	25.293	18.820	13.519
<b>Agriculture</b>	35.897	33.208	33.236	33.898	34.675	31.746	28.439

<sup>45</sup>RFNBO: Renewable fuels of non-biological origin. Renewable fuels of non-biological origin.

<b>Waste</b>	15.421	16.740	16.230	14.731	14.611	12.954	11.322
<b>Refining industry</b>	11.877	10.366	10.452	10.229	9.245	8.380	6.031
<b>Other energy industries</b>	1.036	3.615	655	989	786	815	760
<b>Other sectors</b>	11.744	11.190	12.712	12.752	12.699	12.413	11.621
<b>Fugitive emissions</b>	3.249	3.037	4.053	3.888	3.785	3.391	2.476
<b>Use of products</b>	957	977	641	919	943	1.023	1.068
<b>Fluorinated gases</b>	10.638	14.831	8.886	5.888	5.099	4.543	3.688
<b>Total</b>	<b>438.760</b>	<b>354.652</b>	<b>333.623</b>	<b>309.814</b>	<b>272.244</b>	<b>239.669</b>	<b>194.590</b>

\* The data for 2025 and 2030 are estimates from the 2023-2030 NECP.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

**Figure 2.1. CO<sub>2</sub>eq emissions per sector. Historical and projection at 2030 (ktCO<sub>2</sub>eq)**

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

The expected decarbonisation in the electricity sector will lead to a reduction in emissions by **33 MtCO<sub>2</sub>eq**. This reduction is the result of the significant penetration of renewable technologies foreseen in the Plan, which will progressively replace fossil-based generation. Renewable electricity generation in 2030 will be **81 %** of the total, consistent with a trajectory towards a **100 % renewable electricity sector by 2050**. In order to enable this renewable integration, different figures are of particular relevance, which will give flexibility to the electricity system, such as energy storage, demand management, aggregators or the digitisation of assets.

In the mobility-transport sector, the planned reduction is **32 MtCO<sub>2</sub>eq**. This result is a consequence of 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**. In this regard, it should be noted that the most recent context, together with the approved rules and the aid adopted, has led to new mobility habits, with a significant boost to both public transport and teleworking, 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 advanced **biofuels**. This sector is key to achieving the energy efficiency targets imposed by the new Fit for 55 package.

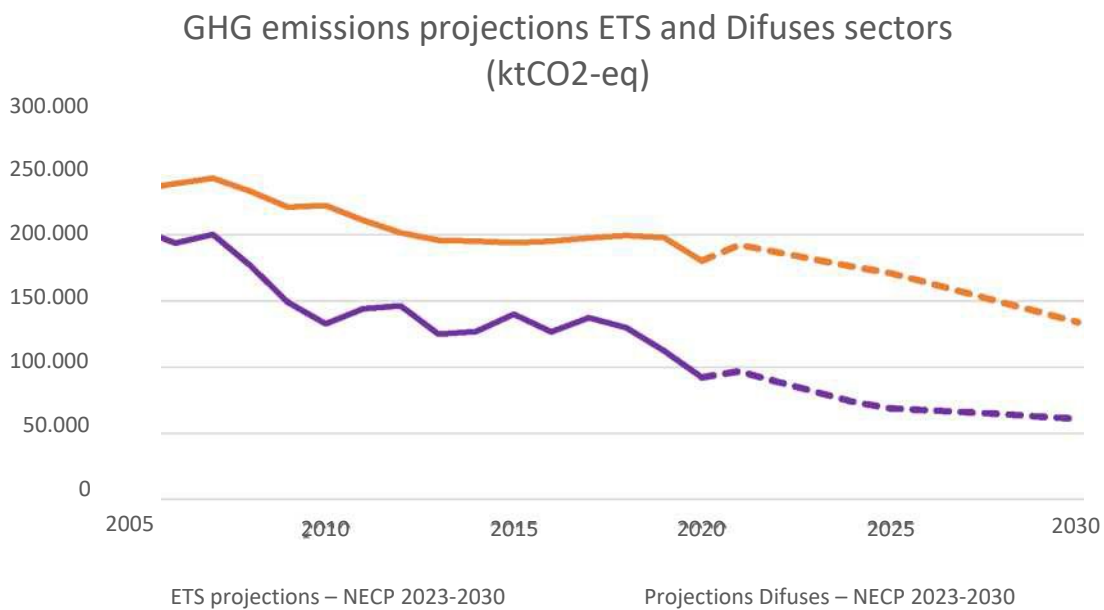
In the industry sector, both emissions from combustion processes and process emissions are reduced, although the biggest reduction occurs in emissions from combustion, where mitigation **reaches 18 MtCO<sub>2</sub>eq** as a result of displacement and reduction of fossil fuel consumption, as well as energy efficiency improvements.

The Plan foresees a **32 % reduction in GHG compared to 1990 levels**, increased ambition compared to the previous NECP.

The decarbonisation analysis foreseen in the NECP is also addressed from the perspective of emissions that are part of the EU ETS system and diffuse emissions (residential, transport, agriculture, waste, fluorinated gases and industry not subject to emissions trading). As mentioned above, gross GHG emissions in 2019 were 309,8 million tonnes of CO<sub>2</sub>eq. Of these, 64 % were in diffuse sectors and 36 % in sectors covered by emissions trading.

The measures provided for in this NECP **make it possible to achieve an emission reduction level of 32 % compared to 1990 levels**. Diffuse sectors contribute with a reduction of 43 % in 2030 compared to 2005 levels, while the sectors subject to emissions trading do so with a 70 % reduction in 2030 compared to 2005.

**Figure 2.2. Emissions target 2030. Historical series (2005-2020) and projected trajectory**

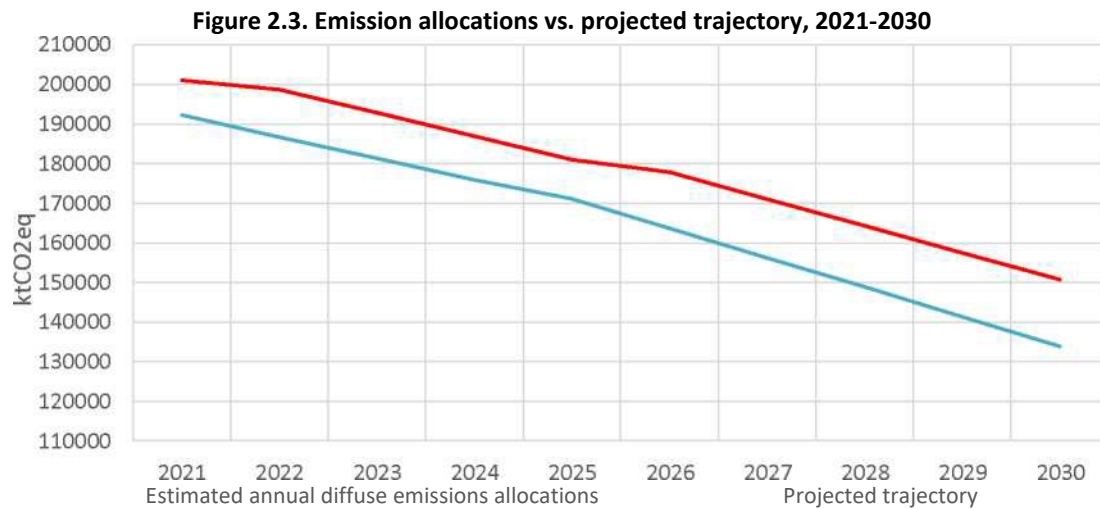


Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In this regard, Regulation (EU) 2023/857 of 19 April 2023 sets greenhouse gas emission reduction targets for diffuse sectors at Union level.

European and by Member State for the period 2021-2030. In the case of Spain, the reduction commitment reached -37.7 % in 2030 compared to 2005 levels. Figure 2.3 represents the annual cap on diffuse emissions for Spain for the period 2021-2030.

<sup>46</sup>Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on linking annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999.



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

The GHG reduction targets set in this National Plan **not only comply with the binding targets set out in EU legislation, but also raise ambition**, contributing to the achievement of the emission reduction target for the European Union as a whole, 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 to increase removals and reduce GHG emissions from the LULUCF sector. When it was originally adopted, no specific targets were set, but a commitment was agreed at Member State level that emissions should not exceed removals under certain accounting rules (known as the 'non-debit rule'). The agreement to revise this regulation, reached at the end of 2024<sup>7</sup>, sets a new EU target of reaching 310 million tonnes of CO<sub>2</sub>eq by 2030 at EU level and sets individual targets for Member States from 2026 onwards (see Table 2.3). **Targets for net greenhouse gas removals (MtCO<sub>2</sub>eq) below**. This represents, for Spain, an increase in removals of around 14 % compared to today.

<sup>47</sup> **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 image in monitoring, reporting, tracking of progress and review

**Table 2.3. Targets for net greenhouse gas removals (MtCO<sub>2</sub>eq)**

A Member State	B Average greenhouse gas inventory data for the years 2016, 2017 and 2018, 2020 submission (ktCO <sub>2</sub> eq)	C Member States' targets in 2030 (ktCO <sub>2</sub> eq)	D Value of net greenhouse gas removals in 2030, 2020 presentation (ktCO <sub>2</sub> eq) (Columns B + C)
Spain	— 38,326	— 5,309	— 43,635
EU-27	— 267,704	— 42,296	— 310,000

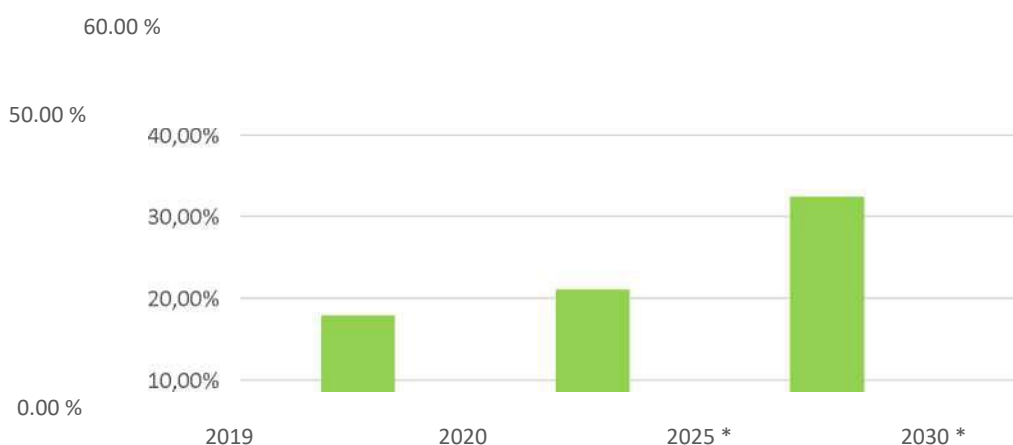
Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

### 2.1.1. Electrification and decarbonisation of the energy system

Three out of four tonnes of GHG originate in the energy system, making **its 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 part of thermal demand and transport, and to have an impact on an increasingly distributed and flexible system. This electrification of demand is particularly supported by self-consumption, which increases installation forecasts to 19 GW in 2030.

As a result of the measures included in this Plan aimed at reducing the use of fossil fuels and promoting renewable energy sources in the three uses of energy – transport, heating 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 measures envisaged**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

<b>Transport</b>	<b>As a result of the measures adopted in this Plan, the greenhouse gas intensity of the transport sector is reduced by 16.6 %, above the 14,5%<sup>48</sup> required by the European Union in 2030.</b>
------------------	--

48 <https://www.consilium.europa.eu/es/press/press-releases/2023/03/30/council-and-parliament-reach-provisional-deal-on-renewable-energy-directive/>

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

<b>Heating and cooling</b>	<b>Electrification and growth of the use of thermal renewables.</b>
----------------------------	---

In the heating and cooling sector, in addition to the continuous technological improvement, new players and investment models that drive decarbonisation are expected to emerge. In this regard, this Plan puts the focus on energy communities, proposing regulatory development to enable them to exercise their right to generate, consume and sell renewable energy, together with the promotion of a set of administrative and economic measures. It is also proposed to increase the use of electricity for heat generation.

According to the plan, the increase in renewable energy is very relevant in all sectors of the economy.

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

<b>Integration of renewables in electricity generation</b>	<ul style="list-style-type: none"> <li>• <b>The measures in the Plan achieve 81 % of renewable generation in the electricity mix in 2030.</b></li> <li>• <b>The transition to a decarbonised electricity system implies significant and sustained uptake of renewable sources as well as solutions that bring flexibility to the system, such as energy storage or demand-side management.</b></li> </ul>
--	---

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 management, to promote the integration of renewables into the electricity system and market.

The large-scale development of renewables over the last decade at international level has led to a substantial reduction in their relative costs to the extent that, in the vast majority of situations, renewable sources, mainly wind and solar, generate the cheapest electricity when it comes to developing new capacity.

The Plan foresees a total installed capacity of 214 GW in the electricity sector for 2030, which is 34 % higher than the forecast contained in the previous NECP. With a view to the planned deployment of renewable technologies for the electricity sector, various tools are relevant, such as the establishment of auction calendars ordering the entry of new renewables, bringing forward to consumers the savings they generate on the bill, the administrative processing processes that ensure compliance with environmental criteria, or the management of electricity grid access permits that prioritise projects with the greatest 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 jointly identify and remove barriers to the deployment of renewables on the territory and thus ensure viable and efficient development.

Particularly important is the deployment of **renewable self-consumption**, facilitated by the existence of renewable resources throughout the national territory, the modularity of installations, the reduction of costs and the new regulation introduced since 2018, which simplifies activity, abolishes tolls and charges for self-generated energy and allows financial compensation for surpluses injected into the grid. In fact, the framework introduced in recent years has enabled an almost exponential roll-out of self-consumption, **enabling the forecasts of the 2030 self-consumption roadmap to be increased.**

<b>Self-consumption</b>	<b>The forecasts of the self-consumption roadmap are exceeded to 19 GW of self-consumption installed by 2030.</b>
-------------------------	---

It will also be essential to integrate solutions that provide 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 and demand-side management are of particular importance, and the deployment of both daily and seasonal energy storage, as well as on a large scale and behind the meter, which increases its forecast to 22 GW, is key.

With this in mind, the Scenario proposed by the Plan represents a considerable increase in renewable generation capacity compared to the current situation.

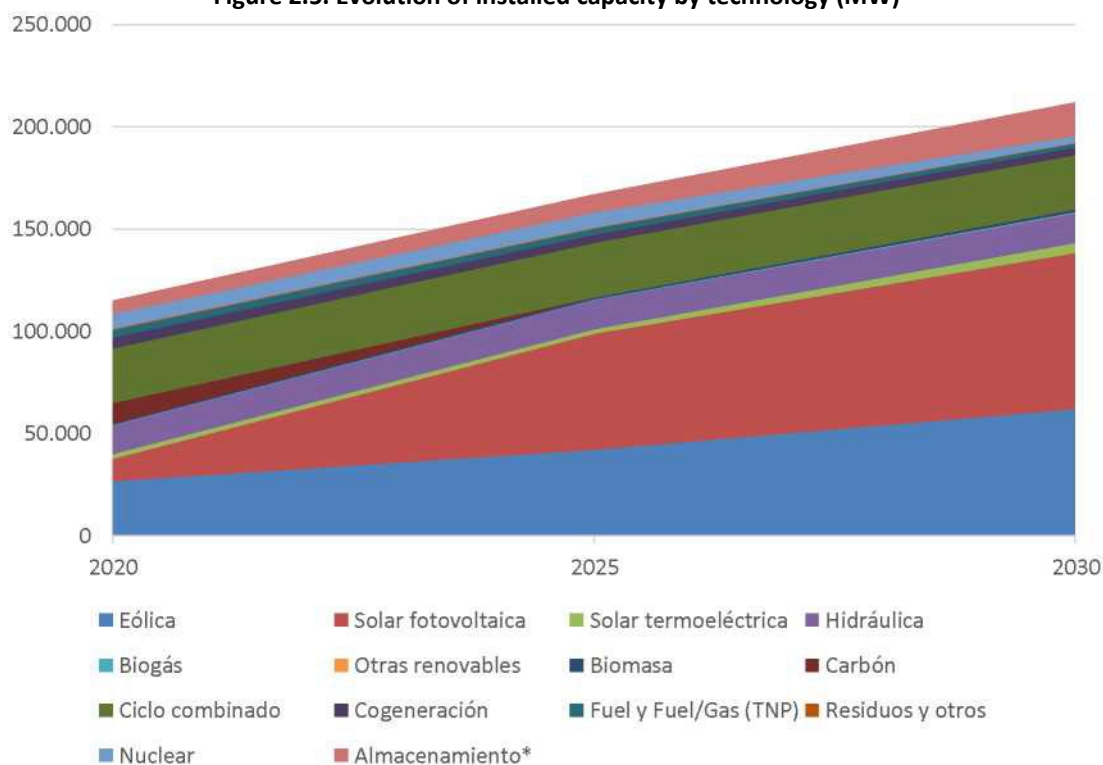
**Table 2.4. Evolution of gross installed electricity power (MW)**  
**Generation park of the PNIEC 2023-2030 scenario. Gross power (MW)**

	Years	2019	2020	2025	2030
Wind		25.583	26.754	42.144	62.044
Solar photovoltaic		8.306	11.004	56.737	76.387
Solar thermoelectric		2.300	2.300	2.300	4.800
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	Peninsula)	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	8.828	18.543
<b>Total</b>		<b>111.100</b>	<b>115.015</b>	<b>166.939</b>	<b>213.963</b>

\* Including the storage of solar thermoelectric power is as high as 22 GW.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023



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

\* Includes both daily, weekly and seasonal storage. Including the storage of solar thermoelectric power, it reaches 22 GW.

Data for 2025 and 2030 are estimates.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In the case of cogeneration, the power values reflected in the Error! The origin of the reference is not found, they correspond to installed powers. This heading therefore includes both active and inactive installations.

**The specific distribution by renewable technologies between 2021 and 2030 will in any case depend on their relative costs, as well as on the feasibility and flexibility of their deployment. Therefore, their relative weight may vary, within a range, from the figures presented here<sup>49</sup>.**

The path towards meeting the 2030 targets is based on the principles of technological neutrality and cost-effectiveness. 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 contour conditions to meet the objectives of the five dimensions of the NECP (see Annexes A and B).

In short, the Plan proposes a balanced and diverse development of the renewable generation park, providing medium-term visibility for each of the technologies, and with the aim of combining the strengths of the various alternatives, seeking the lowest cost to consumers, availability of the resource, value added services to the system that facilitate the integration of renewables, etc.

### 2.1.2. Adapting to climate change

Law 7/2021 of 20 May 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,

<sup>49</sup>With regard to the possible actions in the hydroelectric and hydraulic pumping systems referred to in this section, account shall be taken of the possible hydromorphological effects on rivers, their river regime and the inputs on the affected sections, since they could affect 'good water status', an objective laid down in the Water Framework Directive and the corresponding river basin management plans. In accordance with Article 4 (7) of the WFD, the exceptional nature of the action shall be justified.

and identifies a number of sectoral areas for which it establishes a series of mandates in this area, highlighting: climate and climate scenarios; human health; water and water resources; energy; city, urban planning and construction; biodiversity and protected areas; forestry, soil and desertification and agriculture and livestock farming.

Article 17 of the Law states that the PNACC is the basic planning instrument to promote coordinated and coherent action to address 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 approval of the first NAPCP, which was in force until 2020, when the new PNACC for the period 2021-2030 was approved, which forms part of the Strategic Framework for Energy and Climate.

The NAPCPs are developed through work programmes. This second planning cycle foresees two programmes covering respectively the period 2021-2025 and the period 2026-2030:

**Table 2.5. Development of National Climate Change Adaptation Plans (PNACC)**

Plan	Adoption year	Period of the Plan	Work Programmes	Period of the Work programme
PNACC	2006	2006-2020	1 RD	2006-2008
			2 RD	2009-2013
			3 RD	2014-2020
PNACC 2021-2030	2020	2021-2030	1 RD	2021-2025
			2 RD	2026-2030

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

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

In this area, specific objectives are defined to address the risks affecting the various components of the energy system:

- Improve knowledge of the impacts of climate change on renewable energy production potentials and translate results into energy planning.
- Improve knowledge of the potential impacts of climate change on the functionality and resilience of energy generation, transmission, storage and distribution systems and identify adaptation measures to prevent or reduce identified risks.
- Improve knowledge of the impacts of climate change on energy demand and identify measures to prevent or limit peaks in demand, especially those associated with heat.
- Identify risks from extreme events in critical energy infrastructure and implement measures to prevent their loss of functionality.

In the field of energy, the PNACC underlines the importance of taking into account the potential impacts of climate change throughout the energy transition process. Projections point to an increase in the average temperature and the progressive reduction of 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 floods and higher peak flows. Adverse weather events, such as heat waves or coastal phenomena, are also expected to be more frequent and may affect coastal energy installations.

As a result, 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 PNACC which, through its Work Programmes (PTs), contribute to a transformation of the energy system towards a model that is more resilient to climate change. The preparation of this Plan is one of the first steps towards building adaptive capacity and providing actions for a better adaptation of the energy system. Data collection and projections are a necessary approach to transforming the energy system so that guides for action and policy design can be extracted, 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 greater presence of renewable energies improve adaptation as they reduce the negative effects related to the intensive consumption of water by thermal and nuclear power plants and their response to temperature increases. In addition, measures to increase storage capacity through various sources and to manage demand will allow better adaptation to a possible decrease in water resources for electricity production.

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

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 of a climate-resilient energy system.

Finally, in order to comply with the information objectives set out in the Paris Agreement and in international and European legislation, MITECO, with the assistance of other ministries and the 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.

### 2.1.3. From generation to demand management and storage

The large-scale **development of renewable generation makes it necessary to plan its integration into the system. The basic and peak generation paradigm** becomes a new variability *versus* flexibility. The Plan seeks system flexibility by allowing demand management and storage to contribute to optimal integration of renewables, security and quality of supply, reducing dependency and improving security of supply.

**Flexibility of the electricity sector**

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

Future energy provision will mainly come from renewable sources in many cases intermittent and unmanageable. 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 main challenges for the deployment of energy storage, the measures needed for its effective

deployment in the context of the creation of a new energy system model, with the dual objective of climate neutrality and the exploitation of the opportunities that this change brings.

The Storage Strategy, adopted in February 2021, provides for a storage capacity of around 20 GW in 2030 and to reach 30 GW in 2050, considering both large-scale storage, distributed storage or behind the meter, with both daily, weekly and seasonal storage technologies. **With the current version of the NECP, the strategy's forecasts are exceeded, reaching 22 GW in 2030.** The precise composition and operation shall be developed in accordance with technological developments and availability as well as the specific requirements of the network in terms of the technical characteristics required for its operation. The development of *stand-alone or stand-alone* technologies and hybrids with renewable generation is envisaged.

Electricity **demand management** is the set of actions carried out, directly or indirectly, by consumers themselves, by public authorities, by energy distribution and marketing companies, by energy service companies and by independent aggregators, on consumers' energy demand in order to change the configuration over time or the scale of their level of energy demand. This contributes to cost reduction, less 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, the introduction of more efficient technologies and techniques, or influence consumer habits. To this end, it is proposed **to develop the role of aggregator and DSR plans**, through which different actors can participate in key services to the system.

In this respect, Royal Decree-Law 17/2022 of 20 September<sup>50</sup> creates an active demand response service, configured as a specific balancing product in accordance with European legislation, which held its first auction on 20 October 2022, allocating approximately 500 MW.

In order to meet these objectives and as developed below, the measures related to manageability and storage are strengthened and increased compared to the original NECP. Among other things, the new market design as well as specific instruments such as the capacity mechanisms provided for in this NECP should provide the right signals for investments in storage, while analysing the specific opportunities both in separate or hybrid storage facilities, in distributed systems, or behind the meter, which can also participate in local energy markets.

#### **2.1.4. The role of citizens in the energy transition**

At the end of 2016, the European Commission's 'Winter Package' proposed to put citizens at the heart of the energy transition. In this respect, Directive 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 actors in the democratisation of energy. Both Royal Decree 244/2019, of 5 April, regulating the administrative, technical and economic conditions for self-consumption of electricity, and the future Royal Decree regulating energy communities, are key to the promotion of these figures, which are taking a leading role in the energy transition in these years. It should also be noted that the aid lines dedicated to these

---

<sup>50</sup>Royal Decree-Law 17/2022 of 20 September 2007 adopting urgent measures in the field of energy, applying the remuneration scheme to cogeneration installations and temporarily reducing the rate of value added tax applicable to supplies, imports and intra-Community acquisitions of certain fuels.

two categories of aid, through Royal Decree 477/2021, are being promoted for self-consumption facilities that include the incorporation of storage behind the meter, or the EC programmes implement and EC Offices for the development of energy communities.

There is now a new reality in which there are many renewable projects which make it necessary to take action to identify the areas for the development of installations, taking into account two factors: cooperation with local authorities and ensuring that benefits are generated for local communities. The latter dimension is particularly important to ensure the success and effectiveness of the green transition.

In addition, the transition to a model based on renewable energy makes it possible to democratise the energy system and offers new opportunities for citizens, corporations and local authorities, who in the conventional model were only consumers and can now be proactive agents. This involvement of new actors and the development of self-consumption makes it easier for citizens and businesses to reap the benefits of renewable generation, promote new sources of investment in decarbonisation, better integration and acceptance of energy infrastructure in the territory, reduction of transmission and distribution losses, use of urban space for renewable generation, increased energy and climate awareness in society and the emergence of new business models.

The **right to access energy** is another fundamental pillar of the change in the energy model. In this regard, they highlight the potential of energy renovation of buildings and self-consumption systems – in particular shared self-consumption – to mitigate situations of vulnerability and energy poverty. These measures are complemented by specific actions to eradicate energy poverty, as part of the National Strategy against Energy Poverty.

Similarly, knowledge and information are the basis for greater involvement of citizens in the field of energy. Therefore, dissemination programmes are planned to allow a better understanding of their relationship with energy, as well as the right to access, for example, their own energy consumption data in a flexible and comprehensible manner.

Furthermore, as a tool to encourage public participation in climate action, Article 39 of the Law on Climate Change and Energy Transition instructs the Spanish Government to strengthen the existing participation mechanisms through the establishment of a Citizens' Climate Assembly at national level. Established in 2021, the Assembly issued a final report setting out the conclusions of its six working sessions, structured around five thematic axes, the Areas of Life and Society (AVS) for ecosystems, community, health and care; consumption, food and land use and work. Concluded in May 2022, the report contains 58 objectives, which are further broken down into 172 recommendations.

**The NECP 2023-2030 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 of access to energy.**

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

- Promote green and sustainable architecture and make it easier for the building stock (both new and existing buildings) to adapt quickly and easily to the best existing energy and water consumption standards.

- Facilitate energy savings and the consumption of renewables.
- Reducing GHG emissions from freight transport.
- Boosting, optimising, restructuring and improving sustainable mobility with efficient and clean public transport infrastructure.
- Reduce the climate change impact of air mobility.
- Reduce the use of the car.
- Work towards a just transition, both in internal migration and in forced migration from other countries and, at the same time, seek synergies between migration and the exploitation of existing and unused infrastructure (empty Spain).
- Increase awareness, knowledge and sensitivity to the consequences and impacts of climate change and ways of acting against it in the training context.
- Engaging society to act on climate change, encouraging change in habits and practices.
- Disseminating and universalising information on climate change that is truthful, science-based, clear, pedagogical and accessible, avoiding the dissemination of false information
- Protection of the rural environment from activities with a high environmental impact, thereby increasing the quality of life.
- Promoting climate resilience by equipping them with mechanisms and resources to understand the risks of climate change and encourage citizens' 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.
- Reduce the sensitivity of workplaces to the potential impacts of climate change, taking advantage of their environmental conditions to improve energy efficiency.
- Reduce the dependence of companies on non-renewable energy by promoting the use of renewable energy and self-consumption.
- Achieve efficient and environmentally responsible processes in companies that ensure value for money and reduction of GHG emissions.
- Prioritise sustainable mobility and reduce private car transport to workplaces to limit CO2 emissions.
- Reduce the impacts of productive and service companies and sectors, facilitating their redeployment and that of their workers, ensuring a just transition.
- Promoting research, development and innovation (RDI) to move towards a decarbonised economy, fostering the circular economy, territorial balance and alliances between universities, businesses and social stakeholder groups.
- To locate new wind and photovoltaic farms in areas of low ecological and environmental sensitivity, including marine areas.

- Disseminate truthful and science-based information on climate change.
- Increase societal interest in climate change.

BORRADOR

## 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 for 2030 and 2050, embodied in both 'Fit for 55' and 'REPowerEU', which sets out the decarbonisation of the economy as a key vector in energy actions. 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***<sup>51</sup>.

---

<sup>51</sup>*Energy Efficiency First Principle*: Commission Recommendation (EU) 2021/1749 of 28 September 2021 on the ***energy efficiency first*** principle: guidelines and examples for its implementation in decision-making in the energy sector and beyond.

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 energy efficiency measures, which are cost-effective and which make energy demand and supply more efficient, in particular through end-use energy savings, demand response initiatives and more efficient energy transformation, transmission and distribution, 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, driving a profound transformation by saving energy in various economic sectors, and giving the public a leading role in the energy landscape, with greater capacity for decision-making and management of energy consumption.

**Energy efficiency involves technology, knowledge, indicators of evaluation and monetisation of savings with respect to reducing energy consumption.** There are key issues that are driven, starting with the economic dimension of energy savings. Together with monetisation and technology, it is essential to have data available for analysis, as well as to develop indicators and statistics to assess the savings achieved by the euro invested.

It is thanks to the important efficiency measures promoted by the Plan that ambitious targets are expected to be achieved both in terms of emission mitigation and renewable penetration in energy end-use. Efficiency measures are central to all sectors of the economy with particular reference to transport and industry, followed closely by the buildings sector, both residential and tertiary. Taken together, they can achieve the objectives in a cost-effective way, also contributing to the expected positive impacts on the economy and employment (see chapter 4).

The Energy Efficiency Directive (Directives 2012/27/EU and (EU) 2018/2002) established a common framework of measures to promote energy efficiency within the European Union with the aim of ensuring efficiency improvements by 20 % in 2020 and 32.5 % in 2030. In the directive currently in the process of being adopted, and for which an agreement has already been reached between the Parliament, the European Council and the Commission, the 2030 target is 40.5 %, indicative for primary energy, and 38 % binding for final energy.

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 52 the energy efficiency improvement by up to 44% in 2030**, compared to 38 % at European level, resulting in final energy consumption (excluding non-energy uses) of **70,2 Mtoe** in that year.

**With the European Union's objective of improving energy efficiency by 38 % by 2030, as a result of the measures provided for in this Plan, it is expected to achieve an efficiency improvement of 44 % compared to the PRIMES reference scenario.**

**Table 2.6. Evolution of final energy consumption excluding non-energy uses (ktoe)**

Final energy consumption excluding non-energy uses in the PNIEC 2023-2030 scenario (ktoe)				
Years	2019	2020	2025	2030
Coal	446	396	230	192
Petroleum products	44.373	34.133	35.844	27.636
Natural gas	14.456	13.819	13.254	11.504

<sup>52</sup>In comparison with the forecasts for 2030 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.



<b>Electricity</b>	20.166	18.887	20.947	22.072
<b>Renewable</b>	5.895	5.511	7.206	8.397
<b>Other non-renewables</b>	217	193	353	408
<b>Total</b>	<b>85.553</b>	<b>72.939</b>	<b>77.834</b>	<b>70.209</b>

\*Data for 2025 and 2030 are estimates.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Spain is already on the road to decarbonisation. Regulatory and fiscal measures to accelerate the transition to a low-carbon economy have been and will continue to be proposed. The competition of all territorial administrations enables us to move forward with this energy transition process, in which the Autonomous Communities and local authorities play a key role. The model of distribution of competences in our country, where the General State Administration, the Autonomous Communities and the Local Authorities share competences in different areas, needs coordination especially in certain areas of strategic importance 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, decarbonisation and transformation of rail and maritime transport, reduction of traffic, use of collective public transport, sustainable mobility and electrification in terms of energy consumption of the transport sector. It also calls for the energy renovation of the building stock already built and the introduction of efficient heat and cold 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 in the same period of around 1.1 %, will result in **an improvement in the final energy intensity of the economy by 2.7 % 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 be reduced at an annual rate of 1.9 % between 2019 and 2030, to 96,7 Mtoe.

### 2.2.2. Cumulative target for final energy savings 2030

The successive Energy Efficiency Directives require Member States to provide evidence of the achievement of a cumulative final energy savings target for the period, first, from 1 January 2014 to 31 December 2020 and, second, from 1 January 2021 to 31 December 2030.

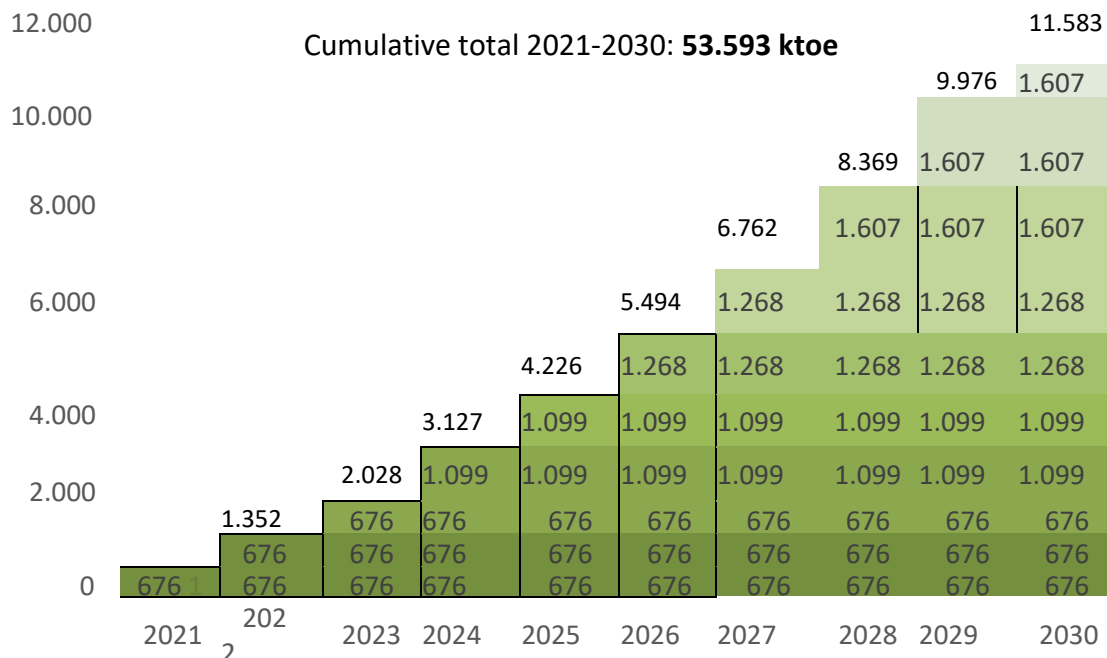
This cumulative final energy target has been calculated in accordance with Article 7 of the Energy Efficiency Directive. For the first period it amounted to 15.979 ktoe, equivalent to 571 ktoe/year of new and additional final energy savings, assuming a linear distribution of the target over the period. In addition, the cumulative final energy savings target for the second of the periods originally amounted to 37.206 **ktoe**, which equated to the achievement of new and additional savings each year from 1 January 2021 to 31 December 2030 of 676 ktoe/year.

However, in the agreement reached by the Parliament, the Council and the Commission, as part of the trilogue procedure for the revision of the text of the Energy Efficiency Directive, a new cumulative target value for final energy savings for the period 2021-2030 has been set at an average of 1.49 %, based on a stepwise increase in the intensity of the target:

- 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 target for final energy savings: 2021-2030



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

### 2.2.3. Sustainable Mobility Strategy 2030

This strategy involves 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, prioritising the social benefits of its actions. 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 in the second principle to achieve the objectives.

The main objective of promoting a more sustainable and efficient transport system is to reduce greenhouse gas emissions, improve air quality, promote the health and well-being of the population, and promote a more equitable and accessible mobility model.

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

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

- Promoting public transport by improving infrastructure and expanding the public transport network.
- The promotion of electric vehicles and the creation of appropriate charging infrastructure, through economic incentives, the installation of recharging points, the incorporation of electric vehicle fleets into public transport and the creation of programmes to replace conventional with electric vehicles.
- Integration of urban planning with sustainable mobility, promoting the development of smart

cities, designed for pedestrians and cyclists, creating low-emission zones and limiting vehicle use in densely populated areas.

- Implementation of measures to improve the efficiency of freight transport, such as promoting sustainable urban logistics, consolidation of loads, use of low-emission vehicles and route optimisation.
- Development of intermodality and integration of different modes of transport, facilitating the connection between public transport, active mobility and other modes of transport, through the creation of infrastructure and services enabling smooth and comfortable transit between them.
- Boosting active mobility by using non-motorised modes of transport, creating dedicated lanes, implementing cycling programmes, designing safe and attractive pedestrian infrastructure, and raising awareness of the benefits of active mobility.
- Awareness raising and education to promote a shift in attitudes and behaviours towards more sustainable mobility by reporting on the negative impacts of excessive use of the combustion vehicle, the benefits of sustainable mobility and available alternatives

#### **2.2.4. Long-term Building Renovation Strategy**

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

For this reason, Directive (EU) 2018/844 substantially amended Directives 2010/31/EU and 2012/27/EU in May 2018, introducing a new Article 2 (a) in Directive 2010/31/EU on the long-term strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private.

Alongside regulation, we need to take into account another strategic plan in the area of buildings, such as ERESEE2020. Update of the long-term strategy for energy renovation in the building sector in Spain<sup>53</sup>, which set the new objective of transforming them into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings.

These objectives for the decarbonisation of the building stock by 2050 are taken up by this NECP. The further details of milestones, indicators and milestones to 2030 and 2040 have been included in the ERESEE 2020, which was presented in June 2020.

The 2020 ERESEE is currently being revised to take account of the agreements reached in 'Objective 55', and in particular the new texts of the directives on energy efficiency and

---

<sup>53</sup>[https://www.mitma.gob.es/recursos\\_mfom/paginabasica/recursos/es\\_ltrs\\_2020.pdf](https://www.mitma.gob.es/recursos_mfom/paginabasica/recursos/es_ltrs_2020.pdf)

renewable energy and the new text that emerges from the current trilogues on the energy efficiency in buildings directive.

The objectives for the energy renovation of buildings up to 2030 are summarised in this Plan in measures ‘2.8. Energy efficiency in existing buildings in the residential sector’, ‘2.10. District heating and cooling networks’ 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).

Objectives in the field of energy renovation of buildings

- All buildings in the building stock will be Zero Emission Buildings (ZEB) by 2050.
- Establishment of minimum energy performance standards for both residential buildings and the tertiary sector.

### 2.2.5. Energy efficiency target in public buildings

Article 5 of the Energy Efficiency Directive (EED) required Member States to draw up and make public an inventory<sup>54</sup> or energy of buildings with heating or cooling systems owned by the General State Administration. On the basis of that inventory, Member States had to **renovate annually 3 % of the floor area** so that these buildings comply with the minimum energy performance requirements set in application of Article 4 of the Energy Performance of Buildings Directive (Directive 2010/31/EU as amended by Directive (EU) 2018/844).

The aggregate energy renovation target between 2014 and 2022 was 2 561 605 m<sup>2</sup> and the renewed surface area was 2 575 462 m<sup>2</sup>, which represents a level of compliance of 101 % of the renovation target set for that period.

In the text agreed in trilogues in March 2023 for the new energy efficiency directive, the 3 % renovation targets are extended to the entire public sector, including all public administrations, not only the AGE.

In order 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 renovation of 300.000 m<sup>2</sup> per year in the General State Administration and also transfers the renovation target of 3 % per year to the rest of the territorial administrations.

Similarly, Article 5 of the agreement reached for the new EED establishes an obligation for the entire public sector to achieve, overall, an annual reduction in energy consumption of 1.9 % compared to 2021, with the possibility of excluding public transport or the armed forces. There will be a gradual introduction in municipalities with less than 50.000 inhabitants and then in municipalities with less than 5.000 inhabitants.

<sup>54</sup><https://energia.gob.es/desarrollo/EficienciaEnergetica/directiva2012/Inventario2018/Inventario-2018-articulo-5.pdf>

Aware of the new ambition, the Transformation, Recovery and Resilience Plan has devoted part of the funds to the comprehensive renovation of buildings of both the AGE and the Autonomous Communities and Local Authorities.

- **Energy renovation of the public building stock of the General State Administration, the Autonomous Communities and Local Authorities of 3 % resulting from Article 6 of the agreement reached on the new Energy Efficiency Directive.**
  - **Annual reduction in energy consumption of 1.9 % compared to 2021.**

BORRADOR

### 2.3. DIMENSION ENERGY SECURITY

The 2023-2030 NECP endorses the safety targets set out in Spain's National Energy Security Strategy adopted in 2015:

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

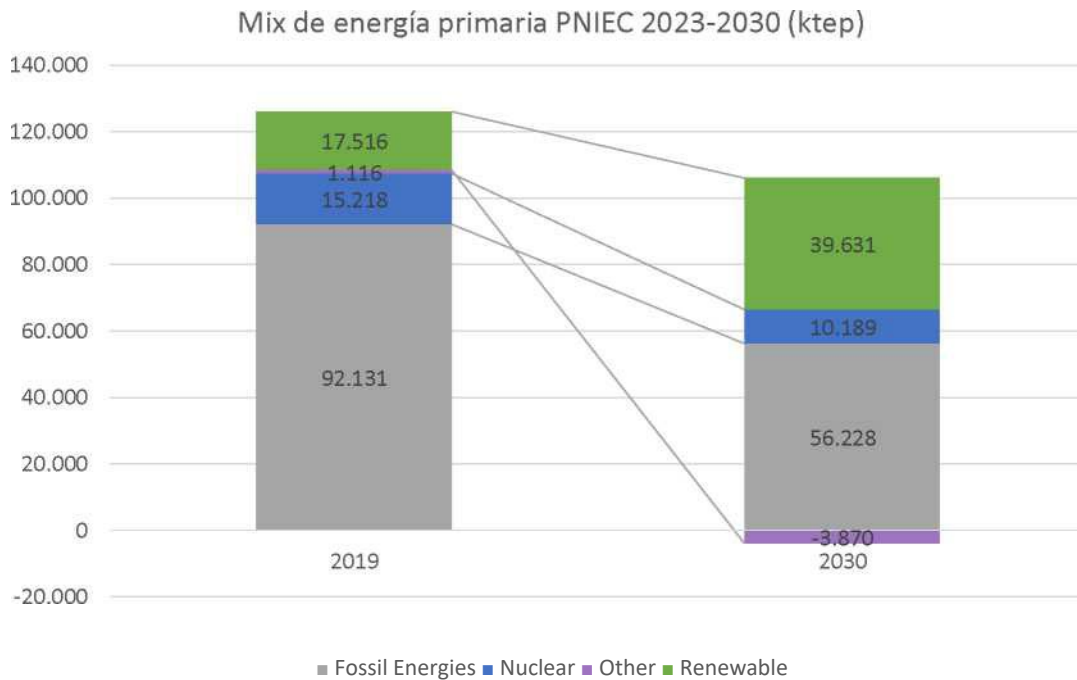
Furthermore, in view of the changes *in* the energy production and consumption mix presented in this Plan, the provision of secure, clean and efficient energy to the various consumer sectors entails major technological challenges and difficulties that need to be addressed from different levels:

- Reduction of external energy dependency, in particular import of fossil fuels.
- Diversification of energy sources and supply.
- Preparing for possible constraints or disruptions in the supply of energy sources.
- Increased flexibility of the national energy system.
- Encouraging the development of new energy sources.

#### **Reducing external energy dependency**

As regards 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 Spain does not have significant volumes of domestic production of these fuels.

This dependence on primary energy has significant economic repercussions. Thus, in 2019, the balance of external trade in energy was unfavourable to our country, worth more than EUR 26.000 billion. In this regard, this Plan reduces the energy dependency ratio by reducing imports 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, 2023

**Table 2.7. Evolution of the primary energy dependency ratio (ktoe)**

Years	2015	2019	2020	2025 *	2030 *
<b>National production</b>	34.118	33.823	34.458	43.806	50.478
	21 %	27 %	31 %	39 %	49 %
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	15.209	10.189
Renewables	17.267	17.922	18.674	27.850	39.601
Non-renewable waste	414	526	540	550	490
<b>Net</b>	96.283	92.159	76.372	67.993	51.701
<b>imported/exported</b>	79 %	73 %	69 %	61 %	51 %
Coal	12.337	5.072	3.100	1.404	1.088
Petroleum products	59.727	56.122	45.661	47.078	36.985
Natural gas	24.489	30.781	27.874	20.329	17.958
Electricity	— 11	590	282	— 978	— 4.360
Renewables	— 259	— 406	— 545	159	29
<b>Total Primary Energy</b>	<b>122.506</b>	<b>125.981</b>	<b>110.830</b>	<b>111.799</b>	<b>102.178</b>

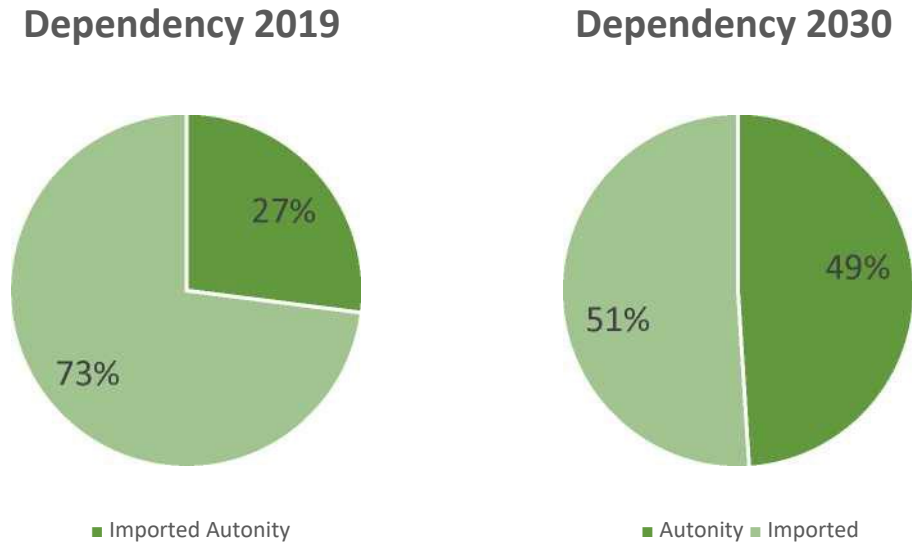
\*The data for 2025 and 2030 are estimates of the PNIEC target scenario.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

**Energy  
dependence**

As a result of the measures provided for in the 2021-2030 NECP, Spain's energy dependency ratio fell by 22 percentage points, from around 73 % in 2019 to 51 % in 2030.

Figure 2.8. Energy dependency in Spain in 2019 and 2030



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

### **Diversification of energy sources and supply**

The main objective of diversifying energy sources and supply is to shape an appropriate primary energy mix in which those sources that are technically and economically viable by 2030 are present, 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 diversify in order to minimise any risks of supply disruption.

<b>Diversification</b>	<b>Maximise diversification of both energy sources and source countries of supply.</b>
------------------------	--

With regard to the security of electricity supply in relation to the disposal of coal in electricity generation by 2030 as a result of market mechanisms (price of CO<sub>2</sub> tonne on the EU ETS market), as well as the orderly and staggered withdrawal of part of the nuclear power plant by that date (four of the seven existing reactors will cease to operate), as set out in the Objective Scenario of this Plan:

**First**, this power withdrawn is offset by the significant penetration of renewable electricity generation technologies, in particular solar and wind power (see Error! **There is no origin of the reference.** Evolution of installed electricity power).

**Second**, Spain has a 26.612 MW fleet of combined-cycle gas plants, which provides significant 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 management is envisaged. These new sources of flexibility will be crucial to replace the gradual decommissionation of conventional thermal generation sources that currently provide the flexibility and firmness required by the electricity system at times of reduced renewable production. Other elements,

such as interconnections, they will also contribute to the necessary security of supply (in addition to fostering the integration of wholesale electricity markets).



**Finally**, the aforementioned reports/models have thoroughly and thoroughly analysed the security of electricity supply and concluded that there are full guarantees of supply in the Objective Scenario provided for in this Plan.

### **Preparing for possible supply constraints or disruptions**

In the third plan, work will continue on preparing for possible constraints or interruptions in the supply of energy sources, with a view to making the national energy system more resilient.

The current geopolitical context has put at risk the supply of natural gas to the European Union in sufficient volumes to maintain 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 renewable 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, which has so far been poorly connected ('energy island') with the European systems, has helped Spain to invest heavily in diversifying routes and means to bring natural gas, in the form of LNG, to our shores, which has made an additional effort on the part of Spanish gas consumers. Between 1969 and 2012, 7 regasification plants (currently all operational) were built, in addition to other infrastructure such as pipelines and underground storages.

Continuing with the gas sector, the Preventive Action Plan and the Emergency Plan pursuant to Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of gas supply were drawn up and forwarded to the European Commission in 2019. These plans are currently being revised so that they can be notified to the Commission in the coming months. These plans are essential to maintain preparedness in view of the new energy context in the European Union.

All of the above 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.

<b>Resilience</b>	<b>Deepen preparedness against possible constraints or disruptions in the supply of energy sources.</b>
-------------------	---

With regard to electricity supply, Spain, owing, among other things, to the low level of energy interconnections with the rest of the European continent, **has a robust system of preparedness to deal autonomously with energy supply constraints or disruptions**, as well as plans to prepare for the specific risks of 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 requires Member States to draw up a risk-preparedness plan for the electricity system as a whole. This plan is intended to be a document covering all the 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 focus, including, inter alia, the impacts that the scarcity of certain raw materials (e.g. reduction of natural gas supply to Europe) may have on the electricity system. This document is awaiting approval at national level.

On the other hand, it should be recalled, in that regard, that electricity and gas system operators have one of their main functions to ensure continuity and security of supply and the proper management of the various systems, carrying out their functions in coordination with all the actors involved.

**Security of electricity supply** is at the core. In Annex D Supply Guarantee: Probabilistic analysis of the coverage of the Objective 2030 Scenario, the corresponding technical analysis by REE is presented in detail. The specific models used for the electricity sector are also set out in Annex B. The main task of the analyses carried out by both models has been precisely to validate that the security of electricity supply of the generation mix presented is guaranteed under the most demanding conditions.

In the area of natural gas, the progressive penetration of renewable gases requires proper preparation of 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 to now inject gas into distribution networks, which have typically been used to feed consumers.

**Flexibility and demand**

The objectives corresponding to the three energy security plans that have been presented respond to needs from the energy supply side.

However, it is also necessary to harness the new possibilities offered by technologies to provide flexibility to the energy system, not only from the supply side but also from the **demand side**.

<b>Flexibility</b>	<b>Increase the flexibility of the system by exploiting the demand-side possibilities of energy-consuming sectors.</b>
--------------------	--

The promotion of demand-side flexibility will unequivocally play an indispensable role in ensuring the supply of electricity, especially in a growing environment of renewable integration and reducing the thermal gap.

This encouragement of demand participation should be articulated from a broad perspective, which should necessarily encompass a greater share of demand 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 to drive demand participation and exploit its manageability potential (for example: 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 role here, given the gradual disconnection of many consumers who have taken 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 will be much more ambitious.

<b>New vectors</b>	<b>Adapt existing infrastructure to the new configuration of energy demand.</b>
--------------------	---

## 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 should be focused on consumers and their protection, providing the necessary conditions to ensure a just transition and address energy poverty.

These objectives are addressed at the following levels (within each 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 the interconnectivity of the electricity market, interconnections not only improve system efficiency by contributing to a more efficient allocation of generation installations by reducing the need for duplicated installations across borders, but are essential for security of supply, especially in a scenario of high penetration of electricity generation from non-manageable renewable sources.

They are also an essential element in achieving an internal electricity market with competitive and homogeneous prices, since they allow an increase in supply (through imports) in those markets where, at a certain point in time and depending on climatic, technical and economic conditions, the price is relatively higher, thereby moderating prices and bringing them closer to those prevailing on the exporting 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 resulting from the provision of immediate services through effectively mobilised balancing energy.
- Reduced discharges of renewable energy (loss of income for producers due to energy generated that is neither consumed nor exported).
- Lower cost of hedging against higher market price volatility.

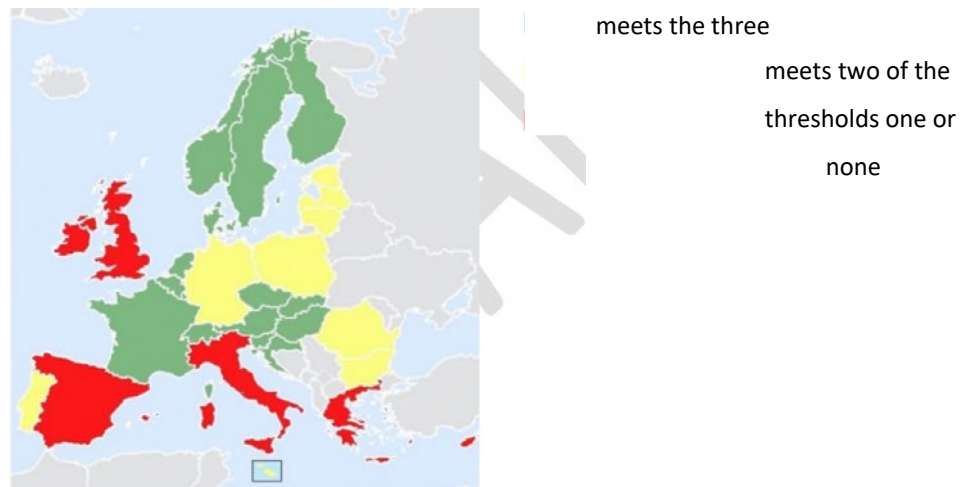
In this regard, the degree of interconnection of the Iberian electricity system with the rest of the European continent is below the objectives set by EU legislation. Currently, Spain's interconnection ratio is less than 5 % of the generation capacity installed in our system. Moreover, if it is considered that actual support for the Iberian Peninsula can only come from the Central European system across the border with France, the interconnection ratio is 2.8 % (after the last interconnection between Spain and

France for the Eastern Pyrenees launched in 2015). In other words, the mainland remains to a large extent an ‘electricity island’.

There is also no compliance with additional and more specific thresholds that serve as indicators of the urgency of action needed, set by 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:

1. Spread of annual average prices of more than EUR 2/MWh.
2. Nominal transmission capacity ratio to peak demand of less than 30 %.
3. Ratio of nominal transmission capacity to renewable capacity of less than 30 %.

**Figure 2.9. Situation with regard to the three thresholds set out in COM (2017) 71855**



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

In short, in 2020, with the planned interconnections, Spain was the only country in continental Europe below 10 % (target proposed by the Barcelona European Council in 2002). Subsequently, Regulation 2018/1999 on the Governance of the Energy Union and Climate Action has raised this 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 is a basic tool for ensuring security of supply, increasing the 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 capacity, both in the mainland and in non-mainland territories, makes it necessary to strengthen and grow transmission and distribution lines in Spain, including the links between the mainland and non-

---

The thresholds<sup>55</sup> are: (1) additional interconnections should be prioritised 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 renewable energy production capacity should immediately examine possibilities for new interconnectors.

peninsular systems and interconnections between island systems. Similarly, it is necessary to develop mechanisms for the management and storage of non-manageable renewable energy sources, making it possible to reduce the discharge of renewable generation.

In the particular case of island territories, the increase in interconnections within their electricity systems will have a direct impact as the production mix of these systems makes a greater contribution to coal-fired, fuel or gasoil power plants than to the mainland mix.

Finally, the role played by the **specific control centre of the electricity system operator (Red Eléctrica de España)**, which optimises the proper integration of renewable energies, cogeneration and waste, making it possible to monitor them in view of the possible variability of forecasts and their integration into balancing services.

This objective must be achieved through the storage of electrical energy, the optimisation of the use of hydraulic resources and the provision of information to consumers.

<b>Electric transport infrastructure</b>	<b>Integration of renewables and reinforcement in non-mainland territories.</b>
<b>Integration of the electricity market</b>	<b>Optimising the functioning of the market.</b>

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 sources of gas and to move towards price convergence before embarking on new infrastructure. In this regard, Spain has been a clear importer for its natural gas interconnections. However, following the outbreak of the conflict in the war in Ukraine, the situation has reversed and in many days of 2022 and 2023 the maximum export capacity steered Spain-France has been reached, leading to addressing, among other measures, the expansion of the capacity available for procurement at Irún's interconnection by 66 %, increased from 60 GWh to 100 GWh per day. This meant at the end of 2022 an increase of 18 % in the total flow capacity from Spain to France through the two existing interconnections, Irún and Larrau, which add up to a maximum total capacity of around 8,5 bcm per year:

- Gross pipeline exports to France reached a record high of 35.4 TWh in 2022.
- The net balance of inflows and outflows with France also turned out for the first time to export (13.83 TWh).
- In the case of 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 interconnections has caused a clear disparity between the markets where LNG imports were available (with increased energy security) and those that depended on pipeline supply from third countries. In 2022, the European Relevant Market (TTF) marked prices above EUR 180/MWh for several weeks between July and September 2022, 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 price with spreads of EUR 30/MWh. The maximum was EUR 240/MWh. These prices have been dampened partly by favourable weather conditions in Europe, but also by the adoption by the Council of the temporary mechanism to limit natural gas prices. In doing so, the Regulation favoured limiting 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 envisaged to optimise the use of interconnections, the European Commission, in Regulation 2017/460, established the principles to be followed in calculating transmission tariffs in order to standardise the methodologies used by the Member States. However, ACER analyses the use of interconnection between France and Spain in its *Market Monitoring Report 2017*, concluding that ‘one important element is that tolls at the Pyrenees Virtual Interconnection Point (VIP) are among the highest in the EU. This is considered to discourage spot trade.’ In particular, 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 from 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) was 2 times higher than from 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 gas system infrastructure, the main objective is to maintain the system’s economic surplus path in the medium and long term. In this regard, in 2020 CNMC approved the different Circulars that will apply in the new regulatory period 2021-2026:

- Circular 1/2020 of 9 January 2006 laying down the methodology for the remuneration of the technical manager of the gas system.
- Circular 2/2020 of 9 January 2007 establishing the rules on natural gas balancing.
- Circular 4/2020 of 31 March establishing the remuneration methodology for the regulated activity of distribution of natural gas for the period 2021-2026.
- Circular 6/2020 of 22 July of the National Commission on Markets and Competition establishing the methodology for calculating local network and natural gas regasification tolls.
- Circular 8/2020 of 2 December 2015 establishing the unit reference values for investment and operation and maintenance for the regulatory period

The energy policy guidelines previously adopted by MITECO underline that these circulars should “ensure the economic and financial sustainability of the gas system”, which has been seen as positive for the evolution of the deficit within the

sector, where, for example, a surplus of EUR 81,1 billion was reached in 2021, which was dedicated to partially amortising the outstanding annuities of the accumulated 2014 deficit, and is now almost fully depreciated.

### **Regulated cost structure in the electricity sector**

The implementation of the new methodologies for electricity transmission and distribution tolls (Circular 3/2020 of the National Commission on Markets and Competition, establishing the methodology for calculating electricity transmission and distribution tolls) and charges for the electricity system (Royal Decree 148/2021 of 9 March 2021 establishing the methodology for calculating electricity system charges) has enabled the establishment of regulated price schemes which, while complying with the principle of economic and financial sustainability of the electricity system, at the same time help to incentivise the decarbonisation and integration of renewables.

In the case of costs financed by 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 scheme) will be gradually reduced. In particular, the cost associated with the annual deficit is expected to end in 2028, while in the case of RECORE costs, their duration and duration will be strongly influenced by factors, with the price of electricity on wholesale markets being one of the main drivers of wholesale markets.

<b>Gas market integration</b>	<b>Securing the market, ensuring the protection of gas consumers.</b>
-------------------------------	---

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

With regard to the integration of the Spanish gas market with the European one, the main tools include optimising the use of interconnections, improving their capacity to respond to the emergency situation caused by the war in Ukraine, and achieving an organised gas market with an Iberian dimension, through the future integration of Spanish and Portuguese PVB.

#### **Protection of vulnerable consumers**

#### **Implementation of the National Energy Poverty Strategy.**

The National Strategy against Energy Poverty adopted in 2019 is the instrument that makes it possible to address the phenomenon of energy poverty from a comprehensive perspective and with a medium- and long-term perspective.

The Strategy provides a definition of energy poverty and, linked to it, that of vulnerable consumers. It has made an initial diagnosis and characterised the problem through the design of official measurement indicators matching those used by the European Energy Poverty Observatory (EPOV), which will allow comparison with other Member States. The indicators are available from the consolidated surveys prepared by the National Institute of Statistics (Family Budget Survey and Living Conditions Survey). Key indicators are:

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

3. Inability to maintain the dwelling at an adequate temperature.
4. Late payment of bills for housing supplies.

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

IDAE, a public business entity attached to MITECO through the State Secretariat for Energy, has been appointed as the body responsible for monitoring and updating the indicators for measuring energy poverty in Spain.

By 15 October each year, IDAE shall publish the result of the primary indicators in the reference year and a comparative analysis with the other EU Member States.

In addition, in the field of regulatory production, a whole set of regulatory provisions have been adopted over the last two years, which have sought to strengthen support and protection schemes for groups in situations of energy vulnerability. Aspects such as the easing of income thresholds, the use of the cohabitation unit to replace the family unit, or the automatic renewal of the social bond, in addition to the creation of the so-called minimum vital supply, are just some of the examples of this intense regulatory output that has achieved the protection of the most vulnerable groups at a time as well as being particularly sensitive 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

- **Addressing the priorities of our environment**, putting science, technology and innovation as key axes in achieving the Sustainable Development Goals of the 2030 Agenda, contributing to the EU's political priorities by aligning with its R & D & I programmes and prioritising the challenges of national strategic sectors through R & D & I, to the benefit of the social, economic, industrial and environmental development of our country.
- **Promoting R & D & I and its transfer through:**
  - 1) generating scientific knowledge and leadership, optimising the position of research staff and institutions, as well as the quality of their infrastructure and equipment;
  - 2) the promotion of scientific quality and 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 enhancing the ability to communicate to our society and to influence the public and private sector.
- **Develop, attract and retain talent**, facilitating career progression 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 in the case of SMEs, increasing the commitment of the business fabric to R & D & I and broadening the scope of innovative companies to make the business fabric more competitive.

To reinforce these objectives set by EECTI 2021-2027 in June 2022, the **Plan to attract and retain scientific and innovative talent** to Space a<sup>56</sup>. In addition, in accordance with the OECD Roadmap to Improve Knowledge Transfer in Space to<sup>57</sup>, a **Knowledge 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 socio-economic impact of public research investment and boost the innovative capacity of Spanish companies.

The objectives set by EECTI require a cross-cutting approach, as it is from the priorities set by the R & D & I policy itself, as well as from the sectoral areas of public policies, 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 and innovation are key pillars. Governments, as promoters and funders of science, development and innovation, play a key role in defining priority strategic lines, promoting targeted research and development and facilitating the introduction and adoption of new environmentally-friendly technologies.

<sup>56</sup>[Scientific and innovative talent attraction plan \(science.gob.es\)](https://www.gob.es/science)

<sup>57</sup>[Improving knowledge transfer and science-business collaboration in Spain | is | OECD](https://www.oecd.org/science/2021/09/improving-knowledge-transfer-and-science-business-collaboration-in-spain/)

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

In particular, EECTI 2021-2027 and EIRP 2021-2023, as part of the strategic action Climate, Energy and Mobility, prioritise areas related to climate change and decarbonisation, sustainable mobility, sustainable cities and ecosystems and the energy transition<sup>58</sup>.

In addition, the defined national strategic lines should be reinforced by collaborative activities that break the classic boundaries between disciplines. Thematic prioritisation enables the development of basic research lines and fosters interdisciplinarity that generates high-impact science and knowledge. There is also an incentive for the multidisciplinary approach that will enable scientific missions to be carried out and projects that drive the SDGs to be tackled. Interdisciplinary research requires fostering interlinkages between disciplines, maintaining an appropriate balance between them, while preserving the implementation of single-disciplinary science.

The objectives of research, development and competitiveness for energy and climate shall be achieved in accordance with the guiding principles set out in the EECTI 2021-2027 and the PEICTI 2021-2023, which are as follows:

- **Coordination of the R & D & I policies** of the AGE, the ACs, the national and EU sectoral policies, through the governance mechanisms of SECTI (in particular the Science, Technology and Innovation Policy Council) and those established in the EECTI. This is in order to promote convergence towards mechanisms for co-creation and co-decision of their respective plans and programmes, using programming and joint funding models that meet the objectives of EECTI.
- **Collaboration and agility** of the administration to enable: 1. make progress on improving **and making** the regulatory and simplification mechanisms more flexible, avoiding duplication in the programming instruments applied to R & D & I policies; 2. establish **synergies** with prioritised actions under the EU framework and the different EU funds.
- **The Gender Perspective** to ensure the application of the principle of real equality between women and men in R & D & I.
- **Social and economic responsibility for R & D & I** through the incorporation of **citizen science and the implementation of co-creation and open access policies**, as well as aligning RDI with societal values, needs and expectations.

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 have a stable **involvement of society**. The aim is to mobilise existing social resources with the aim of optimising the transition in terms of talent for innovation and the search for solutions and finding the necessary support to overcome the difficulties that will arise along the road, to motivate the

---

<sup>58</sup>Examples of these priority research areas include: (1) in relation to climate change and decarbonisation: Hydrogen and renewable synthetic fuels; Renewables; Batteries; Recycling techniques; New materials for generation and energy storage systems; Sustainable energy conversion and CO<sub>2</sub> storage schemes; New methods for estimating economic damage caused by climate change; Turning points in the climate change economy; Impact of natural disasters on local economies; (2) in relation to sustainable mobility: Catalysis for more efficient fuels; Efficient vehicles (hybrid, electric, fuel cell, hydrogen); Innovation in rail, air and maritime transport; Sensory (sensors and biosensors) with mobility and transport applications; (3) in relation to sustainable cities and ecosystems: Clean and smart cities and territories; Efficient construction and climate systems; Clean manufacturing techniques; Techniques for the preservation of the environment; Maritime engineering (coasts, coastlines, estuaries); New building materials compatible with environmental protection.

major behavioural changes needed and to involve society as a whole of the opportunities it brings. The energy transition towards a renewable energy model allows citizens to be placed at the heart of the energy system, offering them new opportunities.

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 affecting the economy as a whole and, in particular, the energy sector, affecting and transforming the definition of the current market model. In short, digitalisation will help to put citizens at the heart of the energy transition. The use of new technologies will facilitate more autonomy in the way people use and manage energy. In this regard, broad spectrum technologies such as the Internet of Things, biotechnology, nanotechnology, artificial intelligence, blockchain, robotics and information and communication technologies stand out.

The digital transformation will enable the development of a data management industry, which is key to energy security. In particular, 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 includes smart grid initiatives to anticipate solutions in the field of new storage technologies, dynamic grid capacities, monitoring of grid elements, self-consumption, electric vehicle and new possibilities for consumers. A smarter energy system enables consumers to be empowered.

## (B) National funding targets

- National funding targets**
- Law 17/2022 amending the LCTI sets the objective for public R & D funding to increase regularly to 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 3 % of GDP in R & D in total between public and private.
  - Spain has been **part of Mission Innovation 2.0** since 8 September 2022. As part of this initiative, each Member State has committed in this second phase to maintain, and whenever possible, increase investment in research, development and energy demonstrations.

Across the board, it should be borne in mind that all actions, including those for R & D & I financed by structural funds and NextGenerationEU funds, must justify compliance with the DNSH principle.

Moreover, the European Green Deal recognises that new technologies, sustainable solutions and disruptive innovation are essential 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 objectives for low-carbon and clean energy technologies

Spain's priority objectives for energy and climate R & I have been defined on the basis of the overall objectives of this Plan, those set out in the implementation of the SET-Plan and the consultation of public and private sector experts. Energy R & I objectives are framed in four areas:

- a) The development of clean energy sources (onshore and offshore wind, concentrated solar photovoltaic and solar power, bioenergy, ocean energy, biomass, geothermal, alternative renewable fuels) and measures to improve energy efficiency. As well as energy carriers such as hydrogen.
- b) Competitiveness to improve the efficiency of the Spanish and European energy network through the development of a highly digitalised internal energy system and market.
- c) Security of supply, to better coordinate domestic energy supply and demand in an international context.
- d) The social and technological drive towards lower energy consumption patterns.

The following priority areas and technologies are specifically defined in line with the SET-Plan, the international commitments undertaken and the specificities and opportunities of the Spanish economy, natural resources, industry and geography:

- **Energy efficiency.**
  - **For building** (SET-Plan Action 5) improvements will be sought to facilitate deployments of:
    - Renewable heat and cold generation 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.
  - Heat pumps.
  - Energy consumption management systems in buildings.
- **As regards 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 renewable energy and the integration of CO<sub>2</sub> capture technologies to reduce emissions. Particular attention will be paid to technologies and applications for Resource and Energy Intensive Industries (SET-Plan Action 6). In addition, the Plan + SE sets out measures to support industry for energy saving and efficiency, including support for cogeneration and increased support for energy efficiency in the industrial sector.
- **Energy generation from renewable sources** in which there is already a competitive or leading position, with high levels of participation by Spanish companies in the market, in line with the European objective of global leadership in renewable energy<sup>59</sup> ( Action 1 and 2, and Action 8 of the SET-Plan). Two priority objectives are defined in this action line: increasing the efficiency of the various renewable energies and reducing the cost of these technologies. Concretely:
    - **Photovoltaic.** Development of new materials and technologies; reduction of costs in the development, construction, operation and maintenance of large plants; integration of solar photovoltaic energy into buildings, and other infrastructures and sectors (electric vehicle, agro-PV, street furniture, floating photovoltaics, etc.); improving the manageability and network integration of photovoltaic generation, advanced manufacturing of photovoltaic technologies.
    - **Concentrated solar energy. Technological solutions to reduce costs and integrate this technology into the energy system** are highlighted, taking advantage of its capacity to increase the system's inertia and manageability. Hybrid solutions also with other renewable technologies to give flexibility to the energy system and shift the use of natural gas as back-up. One of the priorities is also the promotion of solar technologies with a medium temperature concentration (90 de C/C400) for the production of heat and cold in industry. By 2050, the development and implementation of the next generation of solar thermal concentrating technology will be promoted in order to deepen the contribution of renewable manageability and firmness to the system at competitive prices.
    - **Biomass.** Technological solutions that make it possible to optimise the value chain, from obtaining the resource to recovering it, seeking to reduce costs and improve the efficiency of facilities and processes. Biomass for the production of heat,

---

<sup>59</sup>The Renewable Energy Directive (EU) 2018/2001 entered into force in December 2018, as part of the [HYPERLINK "https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package\\_en"](https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en) Clean Energy for All Europeans package, which aims to keep the EU as a global leader in renewable energy and, more generally, to help it meet its emission reduction commitments under the Paris Agreement. The ambition and measures of the Directive have been revised several times in order to achieve the urgent emission cuts (at least 55 % by 2030) needed to achieve the EU's higher 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 Communication on REPowerEU (COM/2022/230 final) to further increase this target to 45 % by 2030.

- electricity and renewable fuels.
- **Offshore wind energy.** Technical developments enabling the costs of this technology to be reduced, with emphasis on floating solutions and techniques for uninvasive manufacturing, assembly, operation and maintenance in the marine environment, which increase potential areas of offshore wind farm deployment and accelerate their contribution to decarbonisation objectives at competitive cost. Innovative solutions for onshore wind energy will also be supported leading to cost reductions and manageability improvements.
  - **Deep and shallow geothermal.** In the case of somera geothermal, given its decarbonisation potential in buildings, technical development will be sought to reduce implementation costs, improve land assessment methods, increase the productivity of surveys and integrate buildings into renovation, among others. Deep geothermia needs support to improve efficiency and reduce costs.
  - **Ocean Energy.** Developments in this technology, both current and wave, need to be encouraged to increase the TRL until 7, 8 and 9. To this end, activities should be targeted at potential demonstration projects that generate 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 contributing to the flexibility and optimisation of the electricity system as a whole**<sup>60</sup> taking into account 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 renewables such as solar thermoelectric with thermal storage, biomass and other storage options. Three areas are therefore included:
    - **Generation:** R & I in other renewable technologies that contribute to manageability and are necessary in the transition process.
    - **Storage: Thermal and electrical storages** systems and the optimisation of their management. In this area, the development of both mobility and stationary batteries will be particularly important. Progress in batteries will require the development of new advanced materials and technologies allowing for an alternative to lithium scenario. Industry collaboration and academic research are envisaged in the development of next generation battery manufacturing *pilots*, also addressing the sustainability of batteries in terms of materials and raw materials, reuse and recycling of batteries (Action 7 of the SET-Plan).
    - **Electrical system:** Achieving a **secure and resilient** system in the context of the energy transition will require technological developments in digitalisation, power electronics, storage, upgrading of equipment and materials, thus aiming at the consolidation of smart electricity grids, increasing asset flexibility, and manageability of renewables (Action 4 of the SET-Plan).
  - **Nuclear energy:** The PNIEC envisages the scenario of an orderly and staggered cessation of operation of the nuclear power plant between 2027 and 2035, but as long as Spain

---

<sup>60</sup>The implementation 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.

maintains its **nuclear power plants** 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 lines of research and technologies include: safe long-term operation (SET-Plan Action 10), radiation protection, irradiated fuel and waste management, 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 committed to research in this technology, both in the experimental programme through ITER, Fusion for Energy and IFMIF-DONES, and in the analysis and simulation programmes.
- **Sustainable transport**: implementation of new solutions that are less polluting, safer, better integrated and responsive to societal demands and uses.
- **Renewable fuels** for the transport sector. **The development of these technologies for their application to aviation, mobility, industry and buildings** is considered a priority. (Action 8 of the SET-Plan).
  - **Development of advanced biofuels.**
  - **Production of 100 % renewable hydrogen** and its use as stationary storage for large quantities and long periods of time.
  - **Biomethane production**
- **New services and technologies for consumers, cities and smart communities.** (Action 3 of the SET-Plan).
  - **Smart solutions for energy consumers** that improve and enhance the citizen's position as an energy consumer. Again, digitalisation technologies are of particular importance in this area.
  - **Smart cities and communities** integrating the different technologies available in urban environments to improve the sustainability and quality of life of citizens. The objective of climate neutrality is pursued in cities, with a systemic and multi-actor approach, and with the citizen at the centre of decisions. With the involvement of municipalities, citizens, universities, businesses, among others, Spain has successful pilot projects in various cities under the *Positive Energy District* (PED) projects, and should be an example to boost innovation and replicate the best solutions. There are 7 Spanish cities selected at 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 our country's starting point and specific context.

In Error! **The origin of the reference is not found.** The correlation between the overall objectives of the NECP and the priorities for R & I for energy and climate is presented schematically:

**Table 2.8. Objectives and priorities**

Objectives NECP	Specific Objectives	Priorities and Objectives R & I + c
--------------------	---------------------	-------------------------------------

<b>32 % reduction in greenhouse gas (GHG) emissions compared to 1990</b>	Residential, commercial and services	<ul style="list-style-type: none"> <li>- Smart solutions for energy consumers.</li> <li>- Smart cities and communities.</li> <li>- Heat and cold generation systems.</li> <li>- Participation of renewable energy in district heating and cooling networks.</li> <li>- Use of renewable energy in buildings.</li> <li>- Thermal and electrical storage.</li> <li>- Renewable energy produced by cities, energy communities and self-consumers.</li> <li>- Active and passive solutions in the energy renovation of buildings.</li> <li>- Heat pumps</li> <li>- Smart energy management systems in buildings</li> </ul>
	Transport	<ul style="list-style-type: none"> <li>- Sustainable transport: promote a change of model in the transport system.</li> <li>- Development of advanced biofuels produced in a sustainable manner from renewable raw materials.</li> <li>- Production of green hydrogen and its application in transport</li> <li>- Mobility and stationary batteries.</li> <li>- Renewable fuels (biofuels, alternative renewable fuels, hydrogen,...)</li> </ul>
	Electricity Generation	<ul style="list-style-type: none"> <li>- Mobility and stationary batteries.</li> <li>- Priority clean/renewable energy.</li> <li>- Safe nuclear generation.</li> </ul>
	Industrial	<ul style="list-style-type: none"> <li>- Low carbon technologies as a priority.</li> <li>- Innovation and energy competitiveness.</li> </ul>



<b>48 % renewables on final energy use</b>	Innovation in EERR technologies where there is already a competitive position	<ul style="list-style-type: none"> <li>- Renewable energy to meet industrial process heat needs at different temperatures</li> <li>- Waste heat recovery</li> <li>- Clean Hydrogen Production</li> <li>- Photovoltaic energy (PV).</li> <li>- Solar Power Concentration (CSP).</li> <li>- Onshore and marine wind energy.</li> <li>- Deep and shallow geothermal.</li> <li>- Ocean energy.</li> </ul>
	Technologies contributing to manageability	<ul style="list-style-type: none"> <li>- Solar Power Concentration (CSP).</li> <li>- Digitalisation of the electricity system.</li> <li>- Biomass</li> <li>- Hybrid solutions</li> </ul>
<b>44 % improvement in energy efficiency</b>	Residential, urban and citizen	<ul style="list-style-type: none"> <li>- Digitalisation of the electricity system.</li> <li>- Smart solutions for energy consumers.</li> <li>- Smart cities and communities.</li> <li>- Heat and cold generation systems.</li> </ul>
	Industrial	<ul style="list-style-type: none"> <li>- Participation of renewable energy in district heating and cooling networks.</li> <li>- Use of renewable energy in buildings.</li> <li>- Renewable energy produced by cities, energy communities and self-consumers.</li> <li>- Active and passive solutions in the energy renovation of buildings.</li> <li>- Utilisation of waste heat, energy efficiency in industrial processes.</li> </ul>
<b>81 % renewable energy in electricity generation</b>	Distributed generation	<ul style="list-style-type: none"> <li>- Digitalisation of the electricity system to achieve a system safe and resilient.</li> <li>- Storage systems</li> </ul>

In order to achieve these priorities, Spain is willing to participate in international consortia of research, innovation and industrial implementation. Particularly important will be the participation in future calls for proposals of the Co-Fund CET (Clean Energy Transition) and DUT (Driving Urban Transition) partnerships, in the SET-Plan Implementation Working Groups (IWG), as well as in Horizon Europe missions, and in Mission Innovation missions, leading areas where there is the greatest scientific and technical capacity and seeking complementarities with leading countries in other priority technologies with less development in Spain.

### 2.5.3. Specific objectives in the science of climate change

In terms of R & I, it is essential to deepen scientific knowledge of oceans, terrestrial ecosystems and the atmosphere for their modelling and assessment of adaptation and mitigation strategies. Due to geographical location and importance for the Spanish economy, particular attention needs to be paid to aspects related to water resources, in particular integrated water management systems, and technologies aimed at efficient use and reuse of water in irrigation, rural, urban and industrial environments, as well as activities that make it possible to advance the protection of aquatic ecosystems, seas and oceans.

Due to their particular relevance and impact on the whole territory, technologies and monitoring systems aimed at preventing and mitigating forest fires, protecting and restoring biodiversity, and natural, rural and urban environments should be promoted.

- Obtaining atmospheric, oceanographic and terrestrial observation data that feed into the models defining these projections.
- Improving the accuracy and predictability of models, to better address adaptation to the

impact of climate change in our country.

- Generating climate change scenarios that make it possible to visualise their impacts, regionalised and for each of the climate variables.
- Disclosure of scenarios to encourage the adaptation of the various economic sectors, especially those considered to be the most vulnerable.

Climate-oriented R & I activities and objectives aim to contribute to the general objectives of the second NAPCP and respond to the commitments of the Paris Agreement and the EU 2030 Framework on Energy and Climate, the European Strategy on Adaptation to Climate Change and the Roadmap 2020 in diffuse sectors, as well as to the objectives of Law 7/2021 on Climate Change and Energy Transition, the Long-Term Decarbonisation Strategy 2050 (LTS) and the Just Transition Strategy. In addition to meeting these objectives and commitments, the climate change R & D & I perspective sees the efficient use of natural resources and environmental integrity as a factor for the country's competitiveness and socio-economic development. Research, development and innovation should facilitate the transition to a productive model that reduces pressure on the environment and 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 implement these priorities, both for research and innovation and for the implementation of solutions at national, regional and local level. In this line, participation in Cluster 5 calls. Climate, Energy and Mobility of Horizon Europe will be key; as well as Horizon Europe calls associated with the European Climate Change Adaptation Mission<sup>61</sup>.

#### **2.5.4. The competitiveness of the economy**

The energy system is a basic pillar of a country's economy. The NECP not only promotes decarbonisation, but 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.

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

- A widespread increase in energy efficiency in all sectors, resulting in less energy needed per unit of GDP in 2030. The policies included in the Plan foresee a 44 % improvement in final energy consumption in 2030.
- Significant substitution of imported fossil fuels with renewable energy of indigenous origin, which also reduces the cost of electricity. According to REE estimates, in this new scenario with a higher share of renewable energy in the electricity sector, the average marginal generation cost will be further reduced by a further 37 % in 2030 compared to the target scenario of the current NECP.
- A reduction in external energy dependency that minimises the negative effects of the high volatility of fossil fuel markets. At present, our country is dependent on 73 % and, according to the plan, it will be 51 % in 2030.

Spain is one of the European countries with the greatest potential to exploit renewable energy, owing to the high availability of renewable resources, Mediterranean and Atlantic winds, a high

---

<sup>61</sup> EU Mission: Adaptation to Climate Change ([https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/adaptation-climate-change\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/adaptation-climate-change_en))

level of sunshine, as well as extensive forests and significant water resources, complemented by a business, technological, innovation and knowledge fabric in this area.

Reducing 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. The expected improvements in energy efficiency also 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 internationally leading companies in sectors that will be important for the energy transition and an important industrial fabric in the field of renewable energy. It also has an important knowledge capital with pioneering institutions such as CIEMAT, CSIC, CENER, the National Hydrogen Centre (CNH2), IDAE, the ERCC of REE, as well as regional research centres, universities, technology networks and unique energy and climate infrastructures.

This Plan addresses the transformation of Spanish industry towards sustainability, through the decarbonisation of this economic sector, using the industrial decarbonisation PERTE as the main driver. This Strategic Plan will make it possible, through public-private cooperation, to 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 the field of energy transition. This is a transformation in which the Spanish economy has much to gain in terms of competitiveness of its economy by taking the form of prosperity, energy security, industrial job creation, innovation, technological development and the elimination of energy poverty.

### 3. POLICIES AND MEASURES

This section sets out the policies and measures to achieve the objectives set by the Plan. The current NECP included 78 measures that have been extended and specified, reflecting their current level of implementation. In this draft update, the number of measures has been extended to 107. This process is the result of the strengthening of the different dimensions as well as 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 draft compared to those in the previous Plan.

**Table 3.1. Measures of the Plan**

PNIEC MEASURES	
<b>3.1 DECARBONISATION DIMENSION</b>	
Measure 1.1.	Development of renewable energy compatible with biodiversity and ecosystem protection
Measure 1.2.	Renewable energy development compatible with 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 1.11.	Framework for the development of thermal renewables
Measure 1.12.	Advanced renewable biofuels 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 reengineering of existing renewable electricity 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 bilateral procurement and promotion of forward markets for renewable electricity
Measure 1.21.	Specific programmes for biomass harvesting
Measure 1.22.	Unique projects and strategy for sustainable energy on islands
Measure 1.23.	Energy Communities
Measure 1.24.	Citizenship at school
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.	Building life cycle analysis
Measure 1.32.	Reduction of GHG emissions in the agricultural and livestock sectors

Measure 1.33. Reduction of GHG emissions in waste management

Measure 1.34. Reduction of GHG emissions related to fluorinated gases

Measure 1.35. Forest sinks

Measure 1.36. Agricultural sinks

Measure 1.37. Taxation

### 3.2 ENERGY EFFICIENCY DIMENSION

Measure 2.1. Low emission zones and modal shift measures

Measure 2.2. Modal shift in freight transport with a higher presence of rail

Measure 2.3. Renewal of the rolling stock of means of transport and efficiency 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 in non-energy intensive industries

Measure 2.7. Improvements in technology and process management systems in 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

Measure 2.11. Energy efficiency in buildings in the tertiary sector.

Measure 2.12. District heat 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 on 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 public 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: transition in high-efficiency cogeneration

Measure 2.22. Financial measures: National Energy Efficiency Fund

Measure 2.23. Energy Saving Certificates Scheme

### 3.3 DIMENSION OF 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 for alternative fuels

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 OF THE INTERNAL ENERGY MARKET

Measure 4.1. 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 Plan 2021-2026

Measure 4.6. Integration of the electricity market

Measure 4.7. Protecting electricity consumers and increasing 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 retail gas sector
Measure 4.12.	Iberian Hydrogen Corridor. H2MED
Measure 4.13.	Local electricity markets
<b>3.5 RESEARCH, INNOVATION AND COMPETITIVITY DIMENSION</b>	
Measure 5.1.	Strategic action in climate, energy and mobility
Measure 5.2.	Implementation of the SET-Plan
Measure 5.3.	Complementary plans in the energy and climate sectors
Measure 5.4.	Scientific and technical infrastructure in the energy and climate sectors
Measure 5.5.	Public Procurement of Innovative Technology (CPTI) and Pre-Commercial Technology (CPP)
Measure 5.6.	Strengthening public venture capital for energy and climate technology transfer
Measure 5.7.	Regulatory changes to facilitate research and innovation
Measure 5.8.	Promoting public-private partnerships
Measure 5.9.	Shared renewable energy research centres
Measure 5.10.	Promoting a renewable energy, storage and hydrogen innovation hub at the City of Energy Foundation, CIUDEN
Measure 5.11.	Improve governance and coordination of SECTI
Measure 5.12.	Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition
Measure 5.13.	Technology platforms and ALINNE 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 Energy and Climate Innovation Funding Facilities
Measure 5.18.	Regulatory testing bank in the electricity sector
<b>3.6 CROSS-CUTTING ASPECTS IN THE GREEN TRANSITION</b>	
Measure 6.1	Gender perspective
Measure 6.2	Mainstreaming climate change adaptation objectives
Measure 6.3	The Recovery and Resilience Facility
Measure 6.4.	The Just Transition Fund
Measure 6.5	Social Climate Fund
Measure 6.6.	Common agricultural policy
Measure 6.7.	Cohesion Policy

---

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

### **3.1. DECARBONISATION DIMENSION**

The set of measures proposed in this update of the NECP leads to a 32 % reduction in emissions compared to 1990 and a 48 % penetration of renewable energy in the final energy use. Throughout this dimension, measures related to the deployment and integration of renewable energies, to reducing emissions through various mechanisms, to reducing emissions through increased sinks, and to other cross-cutting issues, be it through taxation or the social dimension of the energy transition, are considered.

#### **3.1.1. Renewables**

The measures included in this dimension address both the decarbonisation of the electricity sector and the decarbonisation of other end uses, including the provision of renewable heat and cold. As regards the transformation of the electricity sector, the increase in the presence of renewables in the electricity sector is deepened, resulting in a driving force behind 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 this sector, promote the reduction of emissions in the sector, either through the use of new green energy carriers or through the transformation and modernisation of the productive sectors. Also important is the reduction in emissions in the residential and service sectors, mainly driven by the increase in electrification and the deployment of self-consumption.

There is now a new reality in which there are many renewable projects which make it necessary to take action to identify the areas for the development of installations, taking into account two factors: cooperation with local authorities and ensuring that benefits are generated for local communities. To this end, work will be carried out on a new framework to boost the identification of new areas for renewable projects with territorial administrations and facilitate the benefit of local communities.

### Measure 1.1. Development of renewable energy compatible with biodiversity and protection of ecosystems

#### a) Description

The development of renewable technologies is essential to decarbonise the energy system and thus deepen the needs of the green transition. Climate change caused by humanity is already increasing the frequency of extreme weather and climate events in all regions of the world. This has led to widespread adverse impacts and related losses and damage to nature and people (Intergovernmental Panel on Climate Change, 2023). These impacts will accelerate if the ambition of the measures is not increased.

The 2030 Strategic Plan for Natural Heritage and Biodiversity (PEEPNyB) identifies climate change as one of the main drivers of biodiversity loss, from genetic to ecosystem. As regards biodiversity, geodiversity and the functioning of ecosystems, scenarios predict that climate change will have mostly negative effects, which will in some cases exponentially be exacerbated by increasing global warming. Even with a temperature increase of between 1.5 °C and 2 °C, drastic declines are expected in most areas of distribution of terrestrial and aquatic species, and an equally significant impact on the environment, substantially increasing the risk of global extinction and the deterioration of ecosystems, especially due to the decoupling of biological rhythms.

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 desertification processes or the increase and aggravation of forest fires.

Combined action of climate change and biodiversity loss exacerbates health risks not only associated with extreme climate events (droughts, heatwaves, floods) but also by favouring greater and faster loss of ecosystem services, including access to clean water and air, or the provision of food and drug-based products, and the expansion of vectors of disease transmitters.

Biodiversity conservation also acts as a tool for climate action. As the PNACC points out, the so-called 'nature-based solutions' seek to make the best possible use of this protective role, not only in rural areas but also in cities.

Of all existing options to mitigate climate change, the deployment of renewable energy is the instrument with the greatest potential to reduce emissions at the lowest economic cost (IPCC, 2022<sup>62</sup>), and is already able to switch to highly emitting energy sources thanks to its increased competitiveness. Their agile deployment is therefore 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 done while minimising potential local impacts on biodiversity associated with the implementation of generation plants in the territory, so that sustainable development is possible that increases resilience to climate change and facilitates biodiversity conservation and restoration.

As pointed out by the PEEPNyB, land use changes, mainly due to agricultural and livestock intensification, are one of the main drivers for biodiversity degradation. In this context, the increasing deployment of renewable energy, both in natural areas – land and land – also requires a change in land use, which, depending on the type of projects and their accumulation, can be significant.

It is for this reason that the Strategic Environmental Declaration (SAD), which concludes the strategic environmental assessment of the PNIEC as at 2030, states that all projects developed by the NECP must include in its design 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. Similarly, the actions resulting from the plan must be compatible with the plans for the recovery, conservation and management of fauna and flora and must be away from protected natural areas. In particular, the DAE 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, areas of importance for the conservation of birds (IBA), areas of importance and critical areas subject to conservation and restoration plans for

<sup>62</sup>[https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC\\_AR6\\_WGIII\\_SPM.pdf](https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf)



protected species, key areas of presence of species declared in a critical situation, areas of passage and dispersion of endangered species (ecological connectivity); as well as bird protection areas against collision and electrocution in high-voltage power lines. The occupation and deterioration of all natural areas protected by the Autonomous Communities must also be avoided.

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, zoning will be established that identifies sensitive and excluded areas for biodiversity, connectivity and the provision of ecosystem services, as well as other environmental values. To this end, MITECO will draw up and regularly update a mapping tool that reflects this zoning and will ensure, in coordination with the Autonomous Communities, that renewable energy projects are preferably deployed 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 classes of environmental sensitivity (Maximum, considered not to be suitable; Very high, Upper, Moderate and Lower) for each type of project analysed. Two maps were updated in May 2022.

The EAD of the NECP notes the value of these instruments, as they will provide guidance to the developer of these facilities in choosing the most environmentally viable location. Its usefulness is also reflected in the various regulatory developments for the promotion of renewables, such as Royal Decree 1183/2020 of 29 December 2007 on access to and connection to the electricity transmission and distribution networks, which allows socio-economic and environmental criteria to be included in calls for tenders for access capacity, allowing the possibility of establishing a score according to the environmental impact, for which zoning will be taken into account.

On the other hand, and taking into account the competences of the Autonomous Communities with regard to biodiversity conservation and spatial planning, the DAE of the NECP recommends promoting the development of the energy and climate plans of the Autonomous Communities, as part of each community's overall spatial planning policy, and incorporating environmental and territorial criteria into the planning, taking as a starting point those established in the NECP through its strategic environmental assessment, and the determinations contained in the EAD itself. In particular, the declaration cites, as the basic content of those plans, the approval of zonations of environmental and territorial suitability for the establishment of renewable energy installations, in particular solar photovoltaic and wind power, depending on the environmental and territorial sensitivity to the development of those projects in a way that favours the process of processing the installations.

Such instruments facilitate the design and presentation of renewable generation projects with more technical firmness from an environmental perspective. However, and in line 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 that not only minimise their associated environmental impact but also 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 NECP points to the need to draw up information guides to good practice, including the possibility of proposing common criteria to serve as a reference for regional legislation and the respective municipal regulations.

As regards the protection of the marine environment, and in accordance with the provisions of the EAD of the NECP, the maritime spatial plans for the five Spanish marine districts (MEDPs) incorporate areas of high potential (ZAP) for the protection of biodiversity and, as a relevant novelty, PAAs for the development of offshore wind energy, determined following a process of work and detailed analysis in which multiple variables have been incorporated: availability of wind resources, affecting marine biodiversity, safety in navigation, aviation safety, and national defence; and reducing conflicts between other current or future uses and activities, such as aquaculture, tourism, or fisheries.

Finally, the 2021-2026 Electricity Transport Network Development Plan includes, among its environmental objectives, soil conservation, preventing erosive processes, preserving the values of aquatic ecosystems, minimising the impact on biodiversity, ensuring ecological connectivity, minimising the occupation of protected natural areas and the Natura 2000 network, minimising the impact on birds and endangered species, preventing the environmental deterioration of the marine environment, reducing health impacts, limiting the deterioration of landscape resources, minimising the impact on

elements of cultural heritage, minimising the ecological footprint of energy infrastructure and promoting the economic and social development of rural areas, among others.

#### b) Objectives addressed

- Create a framework for the **development of renewables compatible with biodiversity conservation and rural development**.
- Promote guides and good practice instruments that encourage the submission of sound projects from an environmental perspective and can be included in the conditions for environmental assessment declarations.
- **Promote increased knowledge**, through research and innovation, to minimise the impacts of renewable installations on terrestrial and marine biodiversity and ecosystem services.
- Strengthen the exchange of knowledge, participation and awareness in the rural environment in order to ensure a renewable deployment compatible with biodiversity conservation and rural development.
- Ensuring **climate-resilient development**.

#### c) Mechanisms for action

- New framework to boost the identification of new areas for renewable projects with territorial administrations and facilitate the benefit of local communities.
- The **areas most suitable for the deployment of renewables with the lowest environmental impact, in particular photovoltaic and wind power, will be identified together with the territorial administrations**. To this end, MITECO shall keep an up-to-date repository with the legislation adopted throughout the territory.

The Environmental Zonification for Renewable Energy Installation will be updated regularly: Wind and Photovoltaic, with the best available scientific knowledge and, in particular, from the aid provided by the Ministry and financed by the PRTR through the Biodiversity Foundation.

It shall be ensured that the spatial location of areas with the highest potential for offshore wind energy development does not compromise the connectivity of ecosystems, especially migratory species corridors.

In order to promote stronger projects from an environmental perspective, which facilitate synergies with other actions to protect and restore biodiversity, guidelines and criteria for the environmental planning of the deployment of renewables will be developed and continuously updated, in compliance with the PEEPnyB.

- Promotion of research for the development of environmental planning guidelines and criteria and for the development of good practices promoting biodiversity in the deployment of renewable energies.
- Promoting the development of innovative applicable technologies, methodologies and processes that minimise the impacts of renewable energy on natural heritage and terrestrial and marine biodiversity.
- Promotion of research to improve knowledge for the development of plans or systems to monitor the impact of renewable energy on terrestrial and marine biodiversity and ecosystem services.

With the knowledge gathered, and in application of the PEEPnyB, developing methods to minimise the impacts of renewable energies on natural heritage, which will be included in the conditions for environmental assessment declarations.

- Drawing up, in application of the PEEPnyB, a coordinated strategy for monitoring the impact of wind farms and solar installations on fauna and flora, sites of geological interest and habitats, through the development of common and standardised monitoring systems and

methodologies, which must be complied with in the relevant environmental impact statements and reports.

- Analysis, in application of the PNAC, of the potential for hydroelectric and biomass production in various climate change scenarios, for integration into energy planning and successive integrated national energy and climate plans.
- Promoting the sustainability proofing of raw materials used as biomass and the indirect land-use change impact it may cause, as well as the study of their impact on natural heritage and biodiversity.

In application of the PEEPnyB, design of an exit strategy allowing the gradual abandonment of the production and use of conventional biofuels and the promotion of advanced biofuels.

- Deepening knowledge, exchange, participation and awareness in rural areas on climate and energy transition to support renewable deployment compatible with biodiversity and rural development. This will be done through participatory processes and multi-directional information sources, i.e. with top-down, bottom-up and co-produced information flows. The approach, including a gender perspective, may include capacity building at all levels, educational and information programmes, use of the arts, participatory modelling and climate services, rural and local knowledge.

#### d) Bodies responsible

MITECO, IDAE, Autonomous Communities and local authorities.

### Measure 1.2. Renewable energy development compatible with territory and rural development

#### a) Description

Spanish society has traditionally favoured the development of renewables, under the highest standards of environmental protection. However, as renewable technologies are rolled out on a large scale and move to fossil technologies, their presence in the territory becomes more evident and the generation map and energy flows within the territory are transformed. This also implies the need for new transmission and distribution infrastructure, substations and high-voltage lines, which must also be integrated into the territory.

Although there are significant benefits (employment, tax revenues, traction on other activities) there is a debate in society on the process, pace and nature of this transformation, including a better sharing of the benefits and costs of the energy transition, in its various 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, an extensive effort will be needed to raise awareness and the joint work of all the actors involved, in order to combine the development of renewables with the establishment of socio-economic benefits in the area, so that they are perceived and received by people living in rural areas. In order to achieve inclusive local development, attention must be paid to revitalising opportunities for the most disadvantaged groups, for local SMEs and for women in rural areas, as they play a leading role in policies to combat depopulation.

Building climate resilience has multiple edges, including the acceptance of renewable projects. In its development, it is necessary to apply an equitable approach so that all relevant actors, including rural communities, can participate in decision-making processes on all the seats, so as to build social trust and deepen and expand the processes of change and transformation of the energy system. The aim is to advance the information needs of local entities and communities in the pace of transformation required by the challenge of climate change and meeting decarbonisation objectives. It is also a question of making progress in the establishment of socio-economic benefits.

In this context, progress has been made in designing instruments that, from the point of view of authorising network access, optimise the socio-economic results for the territory. Article 18 (1) of Royal Decree 1183/2020 of 29 December on access to and connection to electricity transmission and distribution networks provides that, in accordance with Article 33(10) of Law 24/2013 of 26 December,

by order of the owner of the Ministry for the Ecological Transition and the Demographic Challenge, on the basis of a report by the Government Delegated Committee for Economic Affairs, calls for tenders for access capacity at a specific hub of the transmission network may be launched for new electricity generation installations using primary renewable energy sources and for storage facilities.

Article 19 sets out several criteria for granting access and connection rights. Beyond the temporal criterion, it includes other criteria 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, and by local companies and administrations.

For just transition nodes (where a coal-fired power plant is closed), the rules and the call for tenders were published on 3 November 2021, by Order TED/1182/2021. The aim was to assess the contribution of renewable projects to the Just Transition Strategy, in terms of employment (with particular attention to women and surplus coal workers), training activities, promotion of self-consumption, with particular attention to associated business or industrial projects and local investments, among others.

On 26 November 2022, the competition for the Just Transition Node Mudéjar 400 kV 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 unemployed people in the area, commitments for the employment of previous coal plant workers and job creation for women.

#### b) Objectives addressed

- **Improving employment opportunities** in rural areas, reducing social exclusion, increasing equality and opportunities for women and young people and strengthening community resilience.
- **Establish socio-economic benefits from the development of renewable technologies in rural and local areas, so that**, in those areas where renewables are installed, the results are optimised in terms of coexistence with and driving on 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 **social awareness and knowledge of renewable technologies, their contribution to curbing climate change and their contributions to rural development**.

#### c) Mechanisms for action

- New framework to boost the identification of new areas for renewable projects with territorial administrations and facilitate the benefit of local communities.
- Developing instruments to make it possible to establish benefits in the regions, with a particular focus on rural areas that promote coexistence with other economic activities and the development of associated economic projects, improvements in the income of the area or sharing of benefits related to the energy transition, such as lower energy costs for citizens and businesses. In doing so, particular attention will be paid to small businesses, disadvantaged groups and opportunities for rural women. The cooperation of municipalities, industry associations and promoters will be sought.
- Encourage participation in the development of renewable projects, involving the local population, 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 are geared towards meeting these needs. Participation mechanisms shall be inclusive and incorporate the gender approach.
- Deepening knowledge, exchange and awareness of climate in rural areas. This will be done through participatory processes and multi-directional information sources, 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 the arts, participatory modelling and climate services, rural and local knowledge. These measures can facilitate awareness, increase the perception of the risk intrinsic to climate change and influence behaviour and social acceptances.

#### d) Bodies responsible

MITECO, IDAE, Autonomous Communities, local entities and sectoral associations.

### Measure 1.3. Development of new electricity-generating installations using renewable energy

#### a) Description

Between 2021 and 2030, an additional 104 GW of renewable generating capacity is expected to be installed. This will require building on the strengths of each of the available renewable technologies.

To achieve this deployment it is necessary to combine mature technologies capable of achieving high energy contributions while reducing the cost of energy supply for all consumers, to introduce measures to facilitate technological diversity by recognising elements such as manageability, system integration capacity or generation firmness, and to continue the momentum of technologies that have not reached their stage of technology maturity in a way that takes into account that they cannot yet 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 proposed in Measures 1.1 and 1.2.

It is also essential for the development of new electricity generation facilities with renewables, to accompany the installation of new power, demand management and storage systems (see Measures 1.5 and 1.6), which optimise the use of the grids and reduce the intermittency of production. This is all the more important in non-mainland territories.

Finally, participatory citizens' projects have additional benefits given their benefits such as greater socio-economic impact or increased social acceptance and public awareness of the virtues of renewable energy. It is essential to have these new players in order to achieve the ambitious renewable development targets that have been set.

#### b) Objectives addressed

- Increasing the deployment of renewable electricity generation in an orderly and sustained manner over time, encouraging citizen participation, and promoting technological development.
- Implement specific measures to enable the orderly deployment of renewable energy and the consolidation and strengthening of the associated industrial value chain.

#### c) Mechanisms for action

The following mechanisms are foreseen for the development of new renewable installations:

- **Calls for auctions for the allocation of the Renewable Energy Economic Scheme**

Royal Decree-Law 23/2020 of 23 June 2014 approving measures in the field of energy and in other areas for economic recovery and Royal Decree 960/2020 of 3 November 2014 regulating the economic system of renewable energy for installations producing electricity 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 generation technologies according to their technical characteristics. sizes, levels of manageability, location, technological maturity criteria and those ensuring the transition to a decarbonised economy, in accordance with Community legislation, as well as taking into account the specificities of citizen participation projects, such as renewable energy communities, small-scale installations and demonstration projects.

The auctions under the Economic Regime for Renewable Energy that have been held since 2020 will be continued, as will the indicative auction calendar that was updated for the period 2022-

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
Photovoltaic.	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 thermoelectric.	Annual increase.		200		200	
	Cumulative since 2020.	200	400	400	600	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 update of the NECP, 4 auctions have been carried out, resulting in an allocated power of 6.380 MW.

- **Local participation in renewable generation projects**

The calls for tenders issued under Royal Decree 960/2020 include mechanisms to promote the diversity of actors and the existence of participatory citizen projects, with the aim 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 auctions, a power quota has been reserved for locally distributed generation installations. These facilities are limited in size, connected to the distribution network and have a local and participatory component in the ownership or financing of the facilities. In addition, its location is close to the electricity consumption centre. Since 2021 auctions under this scheme have included a reserve for projects of limited size based on local participation and funding, while the PRTR has been promoting specific energy community projects. Measure 1.24 includes in more detail specific mechanisms to increase citizen participation.

- **Specific programme for non-peninsular territories**

Aid programmes have been designed for new renewable installations in non-mainland territories, in particular those that can provide a guarantee of power, giving priority to projects that include demand management or storage systems. Measure 1.22 specifically develops the sustainable energy strategy on islands.

#### d) Bodies 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 facilities that improve in some respects comparable state-of-the-art renewable technologies or enable the exploitation of untapped renewable resources, 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 axis is to be developed, inter alia, in the Palanca Policy 3 'A just and inclusive energy transition', and within that policy, Component 7 'Deployment and integration of renewable energy' is part of it. Investment actions under this component include Investment 1 'Development of innovative renewable energy, integrated in buildings and production processes'.

This investment provides for the use of investment aid lines as well as direct public investment in pilot projects to ensure rapid activation of the mobilisation of investments that will boost the development of renewable energy projects needed to meet the renewable energy penetration targets, support for technologies that are not yet fully competitive or do not have a high pace of deployment, as well as

adequate environmental, social and productive integration ensuring the viability of renewable deployment also in the medium and long term.

These investments and economic support measures provide an enabling framework for various technological options, such as self-consumption of electricity, renewable electricity and thermal energy in the agricultural sector, concentrated solar energy for industrial processes, air conditioning in the residential and service sectors, hybrid renewable installations, bioenergy or solar thermoelectric generation with large-scale storage leading to greater manageability.

#### 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 infrastructure.

#### c) Mechanisms for action

The following mechanisms are foreseen:

##### **Framework for innovation and technological development of renewable energies**

This measure will strengthen the framework for innovation and technological development of a range of renewable energy sources and contribute to progress towards the 100 % renewable energy target in energy demand. The renewable sources covered by this measure include the following sectors: Offshore wind, energy storage, biogas, green hydrogen.

For each sector, the following is envisaged:

**Offshore Wind:** Implementation of the ‘Roadmap for the development of the Marine Wind and Marine Energy in Spain’. The objective of this Roadmap is to reduce administrative barriers to the development of this renewable energy source. In particular, the Roadmap will aim 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. In implementation of measure 3.5 (Framework for boosting investment in offshore wind and offshore energy), Royal Decree 150/2023 of 28 February approving the maritime spatial plans for the five Spanish marine districts was approved, the purpose of which is to approve the five 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 the reform C7.R4 dedicated to the Framework for Innovation and Technological Development for Renewable Energy, and milestone CID #113 (C7.R4).

**Energy Storage:** Development of the “Energy Storage Strategy”. Within the Palancas de Desarrollo Tecnológico, the Strategy identifies the following measures: (a) Promote the creation of platforms for experimental and research laboratories; (b) Enhancing technology transfer; (c) quadruple helix initiatives; (D) harnessing European and national initiatives that act as a lever for innovative projects; (e) Promoting the raising of European funds for innovation; (f) Support measures for the development of pilot projects; (g) Stepping up long-term R & D & I in storage; (h) Strengthening research in technologies behind the meter; (I) Advanced battery research; (j) Promoting R & D & I in all technologies; (K) Support R & D & I of renewable hydrogen value chain technologies.

**Biogas:** The measures for R & D & I included in the Biogás Roadmap will promote the development of Spanish energy and environmental technology, helping to boost Spanish companies and industries in the biogas value chain (mainly in the agro-industrial, livestock, agricultural or waste management sectors). In particular, the Roadmap will aim to: (a) promote research to assess and minimise emissions of air pollutants other than greenhouse gases; (b) facilitate pre-feasibility studies of projects for the thermal application of biogas; (c) Boosting demonstration projects for the use of biogas in industry; (D) promote the carrying out of

studies on the pre-feasibility of projects to be carried out in waste plants and wastewater treatment plants for the application of biomethane in vehicles; (e) Boosting demonstration projects with local entities for direct biomethane in transport; (f) Promoting innovation in less mature technologies.

**Floating photovoltaic:** In order to encourage the development of floating solar photovoltaic installations, allowing the sustainable use of public water resources, a Royal Decree establishing the system for the installation of floating photovoltaic plants in the public hydraulic domain is under preparation, 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 commissioning of this type of facility.

**Other renewable technologies:** There are other generation technologies (e.g. solar thermoelectric with large-scale storage or deep geothermal, among others) that, although not yet competitive, have great potential. Calls for proposals will be launched for financial support instruments, with a reduced volume of power enabling demonstration or *flagship projects to be accommodated*. Depending on the specific needs of each case, the auction could be supported by public financing.

- **Specific support**

- Within the framework of the PRTR and in line with the Roadmap for the Development of Marine Wind and Marine Energy in Spain of December 2021, Order TED/1204/2022 of 2 December establishing the regulatory bases for the **programme for granting investment aid for pilot projects and testing platforms and port infrastructure for offshore renewables** was published in 2022 under the PRTR (RENMARINAS DEMOS programme), funded by the European Union, NextGenerationEU. By decision of 21 December 2022 of the Board of Directors of E.P.E Instituto para la Diversificación y Ahorro de la Energía (IDAE), M.P. formalised the first call for applications for this aid programme, with a budget of EUR 240 million.
- Order TED/467/2023 of 28 April, financed by PRTR funds, has been published and the first **call for applications for aid for feasibility studies for projects of an innovative nature for medium and high temperature geothermal energy** under the PRTR has been approved. Managed by IDAE, it is intended for feasibility studies of projects, of an innovative nature, of medium and high temperature geothermal energy, aimed at electricity generation.
- 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 building components of complex systems or constructing prototypes in a laboratory environment and experimental development activities that include the development of commercially usable prototypes or pilot projects.
- Order TED/706/2022, of 21 July, approving the regulatory bases and incentive programmes for granting aid to **individual projects for biogas installations** under the PRTR has been published. It is aimed at actions for the energy use of organic waste that boost the circular economy.
- Order TED/1177/2022, of 29 November, approving the regulatory bases for granting aid for **innovative hybrid energy storage projects with electricity generation facilities 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 by increasing the integration of renewable energy. It falls under Component 8 'Electricity infrastructure, promotion of smart grids and deployment of flexibility and storage' of the PRTR, and in particular its investment 1 (C8.I1) 'Deployment of energy storage'.

**d) Bodies responsible**

MITECO, IDAE, in collaboration with MCIN.



## Measure 1.5. Energy storage

### a) Description

The transition to climate neutrality is a profound transformation of the energy system with increased penetration of renewable resources. The power sector is undergoing a profound paradigm shift from a centralised generation system based on 'base' and 'peak' generation with predominantly passive demand to a new model where variability and partial predictability of renewable generation need to be managed using tools that give flexibility to the electricity system. 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 bookings.

This plan foresees the development of storage as one of the key tools for granting flexibility to the electricity system, 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 with the electrification of the economy, or, in different end uses, such as thermal energy storage.

Electricity systems with high penetration of renewables have yet to solve some of the challenges associated with their integration. These include the use of spills and the provision of inertia of a rolling or synthetic type. 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 there are others that have a way forward in terms of technological development. It is necessary to make progress 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, requiring regulatory, market, technical management of the energy system and 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 both the system, the improvement of the integration of renewables and the management of the grid, which will ensure security of supply; to ensure that consumers, 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 the context of the creation of a new energy system model, with the dual objective of climate neutrality and the exploitation of the opportunities that this change 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)** which, while retaining the reference of the European Green Deal and the REPowerEU Plan, emphasises that:

- System transformation requires greater flexibility, understood as the ability of the energy system to adapt to changing network needs and to manage variability and uncertainty of demand and supply while achieving the decarbonisation objectives of the energy system.
- Different energy storage technologies (including mechanical, thermal, electrical, electrochemical and chemical) 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, having 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 having a storage capacity of around 20 GW in 2030 and reaching 30 GW in 2050, considering both large-scale and distributed storage, with both daily, weekly and seasonal storage technologies. The current version of **the NECP brings these projections to 22 GW in 2030. The precise composition and operation shall be developed in accordance with technological developments and availability as well as the specific requirements of the network in terms of the technical characteristics required for its operation. The development of stand-alone or stand-alone technologies and hybrids with renewable generation is envisaged. 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 provided for in this Plan, 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 in the Energy Storage Strategy. In a system with a 81 % share of renewables in electricity generation in 2030 and 100 % in 2050, flexibility will be essential for safe operation.
- Strengthen and promote the national storage industry for use in all possible applications and integrate different companies in the energy sector value chain. The aim is to capture the maximum potential in terms of 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.
- Put citizens at the centre. The deployment of storage behind the meter has seen a strong momentum in recent years, mainly

### c) Mechanisms for action

- **Implementation of the Energy Storage Strategy**

The integration of renewables included in this Plan requires the installation of storage capacity to reach 22 GW of storage by 2030, including daily, weekly and seasonal storage technologies. The reduction in the costs of renewables for 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.

To ensure that the electricity system has the aforementioned storage capacity, an analysis will be made of the need to establish remuneration frameworks that – considering the degree of maturity of the different storage technologies – complement the price signals that these facilities receive from the energy and system-balancing markets. 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 in the law, the use of non-fluent public water resources for the generation of electricity in the new concessions granted will take as a priority support for the integration of non-manageable renewable technologies into the electricity system. To this end, reversible hydropower plants will be promoted in particular to manage renewable production, respecting a flow regime that makes it possible to comply with the environmental flows of the bodies of water concerned and supporting river basin regulation in conditions of extreme events, in a way that is compatible with efficient management of the water resource and its environmental protection. By regulation, mechanisms may be put in place to apply to new concessions granted a pumping, storage and turbinar strategy to maximise the integration of renewable energies, subject in any case to compliance with the environmental objectives in the river basin plans.

- **Recovery, Transformation and Resilience Plan**

Specifically, the ‘just and inclusive energy transition’ policy of the PRTR includes among its objectives the deployment of storage technologies, the Energy Storage Strategy being the key to its implementation.

Within this leverage policy, Component 8 should be highlighted: electricity infrastructure, promotion of smart grids and deployment of flexibility and storage, endowed with EUR 1.365

billion, whose main objective is to ensure the transformation of the energy system to ensure that it is flexible, robust and resilient so that it can be primarily renewables-based. To this end, the gradual adaptation of network infrastructures, as well as their digitalisation and the deployment of tools providing flexibility, such as storage, will be promoted 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 endowed with EUR 684 billion. In its implementation, the following support programmes have been designed to boost energy storage:

- **Royal Decree 477/2021** of 29 June on aid for the implementation of various incentive schemes linked to self-consumption and storage, using renewable energy sources, as well as to the introduction of renewable thermal systems in the residential sector, under the PRTR, allocates EUR 220 million to boost storage *‘behind the meter’*.
- **Order TED/1447/2021**, of 22 December, approving the regulatory bases for granting aid for innovative R & D energy storage projects under the PRTR. Industrial research initiatives include building components of complex systems or constructing prototypes in a laboratory environment and experimental development activities that include the development of commercially usable prototypes or pilot projects.
- **Order TED/1071/2022**, of 8 November, laying down the regulatory bases for programmes for granting aid for investment in the repowering of wind turbines, in the technological and environmental renovation of mini-hydroelectric plants of up to 10 MW and in innovative installations for recycling wind turbine blades, under the PRTR, specifically allocates EUR 20 million to the incorporation of storage in these installations.
- **Order TED/1177/2022**, of 29 November, approving the regulatory bases for granting aid for innovative hybrid energy storage projects with electricity generation facilities from renewable energy sources under the PRTR. 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 by increasing the integration of renewable energy.
- In accordance with the Guidelines on State aid for climate, environmental protection and energy approved by the European Commission in 2022, the European Commission has been notified of an aid programme for the promotion of stand-alone energy storage, pumping and thermal storage facilities, for which the Basic Order is in the process of public hearing at the date of preparation of this draft, and its final text is subject to the conditions laid down in the European Commission Decision authorising the aid programme. In addition, investment 3 under Component 8 “New business models in the Energy Transition” foresees EUR 156 billion to boost solutions that help to provide flexibility for the energy sector and increase innovation to meet the challenges posed by the energy transition. To this end, an aid programme has been launched for this purpose, governed by Order TED/1359/2022 of 28 December, for which the first call was launched in June 2023.

#### **d) Bodies responsible**

MITECO, 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 put in place mechanisms and services that give flexibility to the energy system, such as demand-side management, complementary to energy storage, addressed in the previous measure. On the other hand, new demands are emerging, such as charging electric vehicles, electrifying air conditioning, or producing green hydrogen, which through smart management can be an additional tool to facilitate demand and grid management.

In fact, increasing the flexibility of the system is one of the actions that contributes to achieving the renewable electricity generation objectives laid down in this NECP. The contribution to further integration of the electricity market is addressed in Measure 4.6.

In turn, and as stated in 'Measure 1.24: Citizenship in the centre', in order to promote a proactive role for citizens in decarbonisation, regulatory changes at Spanish and European level and technological development encourage citizens to switch from passive consumers to actors and producers and can also participate in demand 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, as well as to residential sectors. Energy communities will be a tool for social acceptance and implementation of demand management actions by citizens.

To this end, regulatory developments, market organisation and business models are needed to harness the potential of distributed energy resource management in general, and demand side management in particular, both for the benefit of the system to enable the integration of renewables and grid management under the best cost-efficiency and security of supply conditions, and to ensure that consumers, individually or in aggregate, directly or otherwise, can participate in the provision of such services.

In this regard, it should be noted that the proposal for reform of the electricity market presented by the European Commission on 14 March 2023 puts flexibility in the energy sector at the heart of the new market. The proposal includes provisions such as requiring Member States to quantify their needs for fossil-free flexibility and setting targets to increase it, opening the possibility to introduce new support schemes, especially for demand side response and storage.

### 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 users in the energy sector.

### c) Mechanisms for action

- **Development of the regulatory and regulatory framework for DSR**

It is necessary to determine the technical requirements for the participation in existing and developing markets of participants offering energy from renewable sources, energy storage operators and those providing demand response services. In addition, in order to ensure the participation of small consumers, it is necessary to develop the role of the aggregator, in particular the independent aggregator, as well as its 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 responsibility. In this regard, Royal Decree-Law 17/2022 of 20 September creates a specific balancing product in accordance with Commission Regulation (EU) 2017/2795 of 23 November 2017 establishing a guideline on electricity balancing.

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 power of 699 MW. Finally, the volume of power

allocated in this auction was 497 MW to be provided in 2.714 hours at a marginal price of 69.97 MWh.

In June 2023, the public information procedure was being carried out on the proposal for a Circular establishing the methodology and conditions for access to and connection to the transmission and distribution networks of electricity demand facilities, the purpose of which is to establish the methodology and conditions for access to and connection to the transmission and distribution networks by demand facilities, which, in accordance with the provisions of Royal Decree 1183/2020 of 29 December, are required to obtain permits for access and connection to the network in order to be able to connect to those networks. Furthermore, between May and June 2023, Red Eléctrica sent CNMC the final proposal on the creation of operation procedure 7.5 'Active demand response service'.

- **Development of the independent aggregator figure.**

The figure of the independent aggregator was introduced into the regulation of the sector by Royal Decree-Law 23/2020 of 23 June. A prior public consultation was held in February 2023 to complete the regulation of this figure. This figure will be key to maximise the use of distributed energy resources and synergies resulting from the implementation of sector integration, as well as to provide an effective demand response commensurate with renewable variability.

- **Boosting sector coupling**

The coupling of sectors, i.e. alignment with other energy uses, such as electric vehicle charging, the generation of heat or cold for industrial or air-conditioning uses, the production of hydrogen, etc., makes it possible to introduce manageability in electricity demand while responding to other energy uses, which makes it possible to reduce discharges and make use of more economical energy for certain uses.

- **Management of energy resources distributed in local markets (see Measure 4.13).**

- **Appropriate choices and signals for the consumer**

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 fees or administrative burdens,...).

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 promote peer-to-peer exchange and monitor transactions.

- **Advice, promotion of active clients and activation of other actors involved**

Information and awareness-raising campaigns for citizens on the possibilities and options available, and the benefits they bring, to promote their participation in the market by responding to price signals. It is also necessary for consumers to have information on their energy rights in order to facilitate the best decision making on all options at their disposal.

- **Development of qualified human resources**

In line with 'Measure 1.27 on Training of professionals in the renewable energy sector', training programmes will be launched for builders, developers, installers and architects, with the aim of promoting the inclusion of those elements that are necessary to implement demand-side management measures (home automation, immotics, Internet of Things, Big data, bidirectional electric vehicle chargers (V2G), storage, automation of systems, smart meters, heat consumption management, etc.), from the design stage of new buildings (residential and services) and renovation of existing ones.

- **Demand-side management and storage pilot projects**

Promotion and development of pilot projects for demand-side management and storage, new

actors that can participate in it and their implementation, inter alia in local energy markets. In this regard, the regulatory sandboxes developed under Royal Decree 568/2022 of 21 July 2006 establishing the general framework of the regulatory test bed for the promotion of research and innovation in the electricity sector will be of great use. Similarly, in order to promote this type of project, Order TED/1359/2022 of 28 December approving the regulatory bases for granting aid for projects of new business models in the energy transition under the PRTR was approved under the PRTR, and the first call was published in June 2023.

**d) Bodies responsible**

MITECO, IDAE, CNMC, REE, distribution system operators (electricity and gas), electric vehicle charging infrastructure operators, Autonomous Communities and sectoral associations.

### Measure 1.7. Adaptation of electricity grids for the integration of renewables

#### a) Description

Renewable electricity generation capacity in Spain accounted for more than 59 % of the installed capacity in the entire generation fleet at the end of 2022.

The NECP provides for a 81 % coverage of electricity consumption with renewables in 2030. In order to minimise discharges of renewable energy, to link generation and demand for electricity, to maximise the use of grid capacity and to reduce the need for fossil-based thermal power stations as a back-up system, it is necessary to strengthen and grow transmission and distribution lines on national territory, including peninsular connections, non-peninsular systems and interconnections between island systems.

#### b) Objectives addressed

Address the new needs of electricity grids in a way that allows for the integration of renewables, the involvement of new actors and security of supply.

#### c) Mechanisms for action

It is necessary to adequately accommodate in the electricity system the large renewable generation capacity that the Plan drives in secure conditions for the system. To this end, the following instruments are envisaged:

- **Adaptation of plans for electricity transmission and distribution grids**

Since the preparation of the current NECP, the **2021-2026 Electricity Transmission Network Development Plan** has been approved, which includes the infrastructure necessary to ensure security of supply by 2026. The current planning integrates renewable energy into the grid in order to help meet renewable energy objectives 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 investments associated with the electricity infrastructure planned for 2026 are EUR 4.554 million, with an average annual investment volume of EUR 759 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 of this Plan.

- **Digitalisation and management**

The design and operation of transmission and distribution networks will have to face major challenges such as the existence of a larger distributed generation with higher levels of intermittency than at present, as well as the transformation of the traditional model of unidirectional energy flows from generation centres to a model of bidirectional and intermittent flows.

Furthermore, in order to optimise investments in a context of high penetration of renewables and increasing electrification of the economy, the networks will need to carry out an important digitalisation process that allows them to improve their monitoring, control and automation systems. In addition, the digitalisation of networks will enable 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 assesses investments in digitalisation, which are essential for flexibility services to operate, and which also enable traditional grids to be converted into smart grids.

- **Recovery, Transformation 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', endowed with EUR 525 million, aims to support investment in digitalisation for distribution networks to adapt and adapt them to this transition process towards a decarbonised, distributed system, with high participation of different actors, flexible and smart. For its implementation, Royal Decree 1125/2021, of 21 December, regulating the granting of direct subsidies to electricity distribution companies to carry out investments in the digitalisation of electricity distribution networks and in infrastructure for charging the electric vehicle from the PRTR funds was approved.

- **Operating procedures.**

Operation procedures have been updated in recent years to include the operation of new actors in the energy system, such as storage, independent aggregators or DSR.

- **Strategy for decarbonising the electricity sector**

Article 34 of Law 7/2021 on climate change and energy transition empowers the Government to require the system operator, transporter and distributors to draw up and submit a decarbonisation strategy as regards its scope of action. This report shall therefore contain the necessary adaptations to the electricity system to safely operate a fully renewable electricity system.

**d) Bodies responsible**

General State Administration (MITECO, CNMC, MCI), REE, distributors and distribution system operators and 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, increase consumer involvement in the production and management of their energy and make use of existing areas. This modality is a tool for citizen participation in the energy transition, an opportunity to fight energy poverty and a factor of competitiveness by reducing and stabilising companies' long-term energy costs.

Therefore, the promotion of self-consumption is one of the main keys to this update of the NECP, for which a target of 19 GW of self-consumption installed for 2030 is set.

The Road Map for Self-Consumption, approved in 2021, sets out the various policies to support and promote this modality. 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 adopted and demand from citizens, businesses and public administrations has facilitated penetration so far faster than expected. Since 2018, when the so-called 'sun tax' came to an end, self-consumption in Spain has multiplied, reaching a cumulative total in 2021 of between 2.500 MW and 2.750 MW 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, makes it possible to set a more ambitious target under this NECP.

### b) Objectives addressed

Boosting self-consumption for decentralised generation, citizen participation and competitiveness of the economy.

### c) Mechanisms for action

The Road Map for Self-Consumption includes up to 37 measures to promote the development of self-consumption. Some of the most relevant ones are extracted and summarised below:

- **Collective self-consumption and citizen participation**

One of the main innovations of the regulatory framework initiated in 2018 is the possibility of collective self-consumption, so that the same generation facility can be shared by different self-consumers, generating 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 residential housing, which corresponds to more than 70 % of main dwellings in our country. The Roadmap therefore devotes a block of specific measures to 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 an envelope of over EUR 1.800 billion. 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 sustain and accelerate the deployment of self-consumption in Spain.

With a view to the future, soft financing mechanisms are also envisaged, which facilitate the mobilisation of private investment by enabling investment to return on the basis of the economic savings of self-consumed generation.

- **Incentive measures at a local level.**

Given the strong local nature of self-consumption, it is necessary to implement promotion measures at municipal, Autonomous Community or, where appropriate, island level, in particular the simplification of formalities (e.g. simple prior notification in the case of installations in buildings not subject to heritage protection) and proper integration into urban planning instruments.

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 Road Map for Self-Consumption, which will facilitate decision-making by the municipal authorities.

- **Boosting self-consumption in vulnerable sectors**

Boosting experiences that exploit the potential of self-consumption regulations to develop systems where public or private self-consumers can share their generation surplus with vulnerable households, as well as other specific measures aimed at alleviating energy poverty.

As foreseen in the National Energy Poverty Strategy 2019-2024 (see Measure 4.2 of this Plan), self-consumption systems can be a tool to alleviate energy poverty. In that regard, the government's actions relating to the promotion of social housing stock, access to housing and the work of social services should take into account the potential of self-consumption to reduce electricity bills and the energy dependence of families and vulnerable groups.

On the other hand, collective self-consumption schemes and the most dynamic energy management mechanisms allow public administrations or social entities to manage situations of energy poverty, not only through financial support but also through the allocation of participation in collective self-consumption promoted by these public administrations or social entities, which would directly reduce the 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 actors in the implementation of real solutions in this area.

- **Office for self-consumption**

In order to disseminate, inform and advise and within measure 7 of the Roadmap on Self-Consumption, an information and advice space has been created on the IDAE website with the aim of supporting consumers who wish to opt for a self-consumption facility.

This space contains information relating to self-consumption (legislation, technical guides, letter box for questions and questions, information on bodies responsible for self-consumption in the various Autonomous Communities, etc.).

- **Updating the rules on self-consumption and roadmap**

As foreseen in the roadmap, the deployment of self-consumption, opportunities and barriers identified will continue to be monitored to update and align the regulatory framework. In addition, the roadmap itself provides for its updating in line with the revision of this NECP, so as to maintain consistency in the objectives set out in both policy instruments.

#### **d) Bodies 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 IDAE.

### **Measure 1.9. Development of new hydroelectric storage capacity**

#### **a) Description.**

Article 7 of Law 7/2021 of 20 May 2021 on climate change and energy transition provides that, in order to meet the objectives of developing new electricity generation facilities using renewable energy, the new water concessions granted shall have as a priority the integration of renewable technologies in the electricity system. It specifies in particular the need to promote the development of reversible hydropower plants that comply with the environmental objectives of water bodies and the ecological flow regimes set out in the river basin management plans and are compatible with the rights granted to third parties, the efficient management of the resource and its environmental protection.

Reversible hydropower plants have as a characteristic a high ratio of available electrical power to stored energy, i.e. the number of hours of storage which, together with the technical characteristics of their turbine, which supplies rolling inertia, make these technologies very well suited to the integration of renewable energy. In addition, this is a mature and proven technology, with extensive experience and technical knowledge in Spain, with a solid value chain at national level. This technology is flexible and

adjustable to times at long unloading times and makes it possible to cope with various operating regimes (working hours, 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 synchronisation of generation units – and their contribution to balancing services. In view of the above, the storage of energy through reversible hydropower plants – especially pure-pumped power plants – is key to the operation of an electricity system based on renewable production, and is all the more relevant in the face of scenarios of greater 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 power stations, thus helping to advance 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 hydroelectric energy storage capacity could be promoted in particular. The use of existing infrastructure, in addition to reducing investment in new storage facilities, limits the associated environmental impact.

#### **b) Objectives addressed**

Development of new hydroelectric energy storage capacity

#### **c) Mechanisms for action**

The following mechanisms are foreseen for the development of new Hydraulic Energy Storage capacity:

- **Simplification of administrative procedures for new reversible hydropower plants using existing reservoirs.**

In the current regulatory framework there are regulatory and administrative barriers that prevent the development of new reversible hydropower plants. It is necessary to establish measures to make it possible to strengthen hydroelectric storage capacity by taking advantage of existing facilities and systems, so as to minimise the environmental impact associated with new locations.

- **Study of the use of hydroelectric storage in state-owned reservoirs**

State-owned reservoirs offer a great opportunity to serve as a lower reservoir in new hydroelectric energy storage facilities, which would contribute to meeting the stated energy transition objectives. The development of new reversible hydropower plants using state-owned reservoirs as a lower reservoir will be considered.

- **Adaptation of the electricity grid for the connection of new storage capacity**

The planning of the transmission electricity network includes forecasts of needs for new developments of generating installations, including hydroelectric energy storage, including the forecast of new evacuation nodes and the reinforcement of existing ones.

#### **d) Bodies responsible**

MITECO, CNMC, REE, Autonomous Communities.

## Measure 1.10. Decarbonisation of the industrial sector

### a) Description

The introduction of renewable energy in industry helps to move towards the decarbonisation of the economy and the exploitation of competitive energy alternatives.

Final energy demand in the industrial sector accounted for around 25 % in 2021. This demand was met by 10 % of renewable energy sources. There is therefore a potential for biomass, as well as other thermal renewable energy sources (in particular biogas, renewable hydrogen and solar thermal), to contribute more significantly to the decarbonisation of the industrial sector. As regards the potential for self-consumption of electricity in the industrial sector, although it is being used intensively so far, there is still a potential to exploit. When designing the policy mechanisms, both increasing the penetration of renewables in sub-sectors that already consume them and diversifying industrial sub-sectors will be considered. Furthermore, to a limited extent to sectors where there are no alternatives to fossil fuels, Carbon Capture, Storage and Use (CCUS) will be taken into account as an application in demonstrator projects, such as process emissions.

Progress in energy efficiency and process management in the industrial domain is specifically addressed in Measures 2.6 and 2.7.

### b) Objectives addressed

Promote the decarbonisation of the industrial sector, by combining actions of various kinds, such as the use of decentralised renewable energy generation and self-consumption in industry, improving energy efficiency and fostering the creation of high added value jobs.

### c) Mechanisms for action

For the development of renewable energy in industry, consideration is given to:

#### • The decarbonisation of industry

The PERTE for Industrial Decarbonisation, approved in 2022, aims to decarbonise production processes, improve energy efficiency, promote the use of renewable energies and promote Spain's energy security.

The PERTE Decarbonisation comprises several public actions to support industrial installations to develop and implement technologies to achieve substantial greenhouse gas emission reductions and improve their energy efficiency, consistent with a long-term decarbonisation path. The objectives addressed are:

- Decarbonisation of production processes
- Increasing energy efficiency
- Improving the competitiveness of the manufacturing sector
- Promoting Spain's energy security
- Promoting the use of renewable energy
- Promoting environmental protection
- High added value job creation

There are 3 action lines within the PERTE:

- Comprehensive action aid line for the decarbonisation of the manufacturing industry.
- Aid line authorised by the European Commission for manufacturing companies participating in the Important Project of Common European Interest (IPCEI) on the renewable hydrogen industrial chain, under the CEEAG 2022 Guidelines on State aid for climate, environmental protection and energy.
- Study and evaluation of the development of a possible CCD Fund and conduct a possible pilot project.

The financing linked to the comprehensive action aid line for the decarbonisation of the manufacturing industry will be EUR 2.370 billion (EUR 870 billion grant and EUR 1.500 billion in the form of loans). The part linked to the promotion of renewable hydrogen has a budget of EUR 450 million in grants. The study and evaluation of the development of a possible CCD fund and the possible implementation of a pilot project counts, if the pilot project is carried out, with a budget

of 100 million in loan. Finally, financing linked to the development of highly efficient and decarbonised manufacturing 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, specific support schemes will be promoted. The PRTR has given a significant boost to this type of action, through the support programme for thermal renewables, governed by Royal Decree 1124/2021 of 21 December 2007.

- **Renewable energy, renewable hydrogen and storage aid programmes**

In line with the respective roadmaps, both renewable hydrogen and biogas and biomethane are key energy carriers to achieve a clean, safe and affordable energy future, because they allow the decarbonisation of hard-to-electrification sectors, such as certain industries such as steel, cement or the chemical industry. The aid programmes included in the EHRA PERTE include support for projects for the sectoral integration of these renewable gases, which are included in Measures 1.15 and 1.16.

In line with the above, it is considered necessary to promote the use of renewable fuels of non-biological origin (called RFNBO by their initials in English) in the industrial sector.

- **Institutional capacity building**

The specific incorporation of energy-related aspects into industrial policy tools will be promoted (at all levels of government).

- **Sectoral agreements**

Voluntary agreements will be entered into with certain industry subsectors to encourage increased consumption of renewable energy.

- **Aid for energy studies, reports and audits to help industry switch to less carbon intensive processes**

These studies should identify the different technological options according to the specific process heat requirements of each industrial sub-sector (which may be based on Best Available Techniques documents developed under Directive 2010/75/EU on industrial emissions), physical, technical and economic potential, and identify challenges and propose measures, in particular as regards the uptake of renewable energy.

#### (D) Respondents

MITECO, IDAE, Ministry of Industry, Trade and Tourism (MINCOTUR), Autonomous Communities and sectoral associations.

#### Measure 1.11. Framework for the development of thermal renewables

##### a) Description

**Energy consumption for thermal uses in 2019 in Spain accounted for around 35 % of total final energy consumption.** In the same year, the contribution of renewables to the consumption of heat and cold stood at around 16.7 %. Achieving the objectives of this Plan will require doubling this contribution in 2030.

The provisional agreement on the revision of the Renewable Energy Directive stipulates that Member States should take the necessary measures to increase the share of renewable energy in heat and cold consumption annually by 0.8 % by 2026 and by 1.1 % from 2026 to 2030, starting from the value reached in 2020. The renewable thermal path set out in this Plan makes it possible to achieve this indicative objective well. In this regard, renewable energy communities can play a very important role in achieving this objective. This is shown by the fact that about 40 % of the energy community projects in the first two calls of the EC programme implemented technologies other than photovoltaic self-consumption. In addition, these 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 different sectors of the economy, including the residential sector. It was also included in the Energy Security + Plan, approved by the Council of Ministers on 11 October 2022, setting out measures to accelerate the energy transition and enable the substitution of natural gas and other fossil fuels with renewable energy sources, in the longer term, accelerating the reduction of fossil fuel dependency.

#### **b) Objectives addressed**

Promotion of penetration of renewable energy sources for thermal use, in particular in the building sector.

#### **c) Mechanisms for action**

The following mechanisms are foreseen to promote the development of thermal renewable energy:

- **Specific mechanisms related to the building sector, in the development of which the Ministry of Transport, Mobility and the Urban Agenda (MITMA) plays a key role:**

- **Integration of renewable thermal energy in buildings**

In order to make progress on this measure, the update of the Regulation on Thermal Installations in Buildings (RITE) entered into force on 1 July 2021 through the publication of Royal Decree 178/2021 of 23 March amending Royal Decree 1027/2007 of 20 July, which created it.

This stage I updating the RITE set out the energy efficiency and safety requirements that thermal installations in buildings must meet in order to help achieve the climate objectives set out in the 2021 Integrated National Energy and Climate Plan (NECP), specifically the objective of improving energy efficiency 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 EU Directives on energy efficiency and renewable energy – specifically 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 using efficient systems that enable energy recovery and the use of renewable energy and residual energy.

With regard to the Technical Building Code (CTE), the new CTE was approved in 2019 through the publication of Royal Decree 732/2019 of 20 December, which substantially amended, inter alia, the Basic Document DB.HE 'Energy Saving' in order to bring them into line with the minimum energy performance requirements laid down in the Energy Performance of Buildings Directive. The main changes it made were as follows: enhance the use of renewable energy by reducing the limit value of previously existing non-renewable primary energy consumption, limiting total primary energy consumption and increasing the minimum mandatory renewable energy contribution to produce DHW without priority to any particular 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 principle does not affect renewable thermal energy.

However, it will be necessary to review and increase the energy efficiency and renewable energy requirements of ETC and RITE in phase II for all new buildings and renovations, including more technical modifications and also digitalisation objectives, in addition to those relating to renewable energy and energy efficiency.

- **Aid programmes (loans and grants)**

In this context, Royal Decree 477/2021 of 29 June 2007 approved the direct granting to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementation of various incentive programmes, one of which was intended to implement renewable thermal systems in the residential sector.

In addition to the previous one, Royal Decree 1124/2021 was published in December 2021, approving the direct granting to the Autonomous Communities and the cities of Ceuta and Melilla of aid for the implementation of incentive programmes for the deployment of thermal renewable energy installations in different sectors of the economy. This programme, in force until 31 December 2023, had an initial allocation of EUR 100 million, which could be increased to twice its amount depending on the degree of progress. This

budget has been distributed among the various Autonomous Communities and Cities, which are responsible for publishing and managing calls for aid, and will be financed from the funds of the PRTR.

It is necessary to continue with lines of support for facilities in buildings, depending on the characteristics, potential and costs of each technology, as well as potential for improving the carbon footprint. In particular, specific lines will be created to:

- Accelerate large-scale deployment and integration of renewable thermal technologies across all sectors of the economy (ambient and geothermal heat pumps, solar thermal energy, direct use geothermal or biomass).
- The renovation of the installed solar thermal park.
- High-efficient ambient energy equipment replacing obsolete systems.
- Renovation of biomass equipment by high-performance equipment.
- r hybridisation of renewable technologies to reach the ‘nearly zero-energy building’.

The specific processing of support for small installations will be considered, by designing simplified lines 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. E.g. reduced VAT on small equipment.

- **Support for thermal renewables in productive sectors**

In addition to Royal Decree 477/2021 promoting thermal renewables in the residential sector, Royal Decree 1124/2021 was published in December 2021, 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 thermal renewable energy installations in different sectors of the economy. This programme, in force until 31 December 2023, had an initial allocation of EUR 150 million, which could be increased to twice its amount depending on the degree of progress. This budget has been distributed among the various Autonomous Communities and Cities, which are responsible for publishing and managing calls for aid, and will be financed from the funds of the PRTR.

- **Integration of thermal renewables through thermal storage solutions**

To promote such solutions, specific support is foreseen under Component 8, Investment 1 “Deployment of Energy Storage” of the PRTR. To this end, on 2 June 2023, a public hearing was launched on the proposals for a Ministerial Order approving the regulatory bases for granting aid for innovative energy storage projects under the PRTR, as well as the decision approving the first call for aid for independent and thermal electricity storage.

For aid granted to thermal storage projects, the aid scheme has been notified by Spain in accordance with Article 108 (3) TFEU and assessed by the European Commission, in accordance with the compatibility conditions and criteria, being in compliance with section 2.5 ‘Aid to accelerate the widespread introduction of renewable energy and energy storage relevant for REPowerEU’ of the Communication from the Commission ‘Temporary Crisis and Transition Framework for State aid measures to support the economy following Russia’s aggression against Ukraine’ (the ‘Temporary Framework’). The launch of this aid for thermal storage is therefore subject to this favourable decision being obtained by the European Commission.

#### **d) Bodies responsible**

General State Administration (MITECO, Ministry of Finance and MITMA); autonomous Communities and local authorities.

### Measure 1.12. Advanced renewable biofuels in transport

#### a) Description

Transport contributes significantly to GHG emissions, the activity being the highest (**29.6 % of the total in 2021, according to the National Atmosphere Emissions Inventory**). This is why it is a key sector in the decarbonisation process.

As part of the European Commission's 'Fit for 55' package of measures, the provisional agreement revising Directive 2018/2001 on the promotion of the use of renewable energy sets an overall target to be achieved by 2030 of a 14.5 % reduction in the greenhouse gas intensity of the energy supplied in the transport sector or a share of renewable energy in the final consumption of energy in transport of at least 29 %. For sector specific sub-targets, a binding combined target for the share of renewable energy supplied to the transport sector in 2030 is set at 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 objectives and consequently the decarbonisation of transport will be achieved by reducing consumption (e.g. by encouraging modal shift) 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 car fleet and also charging infrastructure, are measures that are detailed in the energy efficiency section of this Plan, so this measure focuses on biofuels as well as on RFNBO.

In certain sectors such as heavy goods vehicles (consumption of which accounts for a significant part of the total for road transport), maritime and aviation, they will continue to be one of the means of reducing the use of fossil fuels in the coming years.

RFNBOs 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 a role to play in the medium and long term heavy transport sectors and are thus considered in the Renewables Directive.

Meeting the consumption targets for advanced biofuels will require a boost in their production, which is still very low. In some cases, this is due to the limited availability of some of the raw materials involved and, in others, to the low level of technological maturity of some of the processes required to manufacture these types of biofuels.

The actions considered in this measure concern both liquid and gaseous biofuels. However, given that biogas and biomethane have other uses in addition to their use in transport, the actions aimed 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 the consumption of biogas and biomethane specifically in the transport sector.

#### b) Objectives addressed

Penetration of advanced biofuels and RFNBOs in the transport sector.

#### c) Mechanisms for action

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 RFNBOs in transport (e.g. renewable hydrogen)
- Update of the certification system for the sale or consumption of biofuels to specifically collect advanced biofuels and in particular biomethane in order to adapt them to the new regulatory framework stemming from the 'Fit for 55' package.
- Introduction by Royal Decree 376/2022 of a specific obligation to sell or consume advanced biofuels for the period 2021-2030.
- Limitation of biofuels produced from food and feed crops.



- Establishment of a pathway for limiting the use of high indirect land-use change-risk biofuels or biomass fuels and their maximum share for the biofuel sales or consumption target.
- Promotion of the consumption of labelled biofuel blends through measures to provide this possibility at filling stations.
- Integration of the national sustainability verification system into the Union DataBase (DERII) in order to ensure the traceability of the sustainability of biofuels.

**d) Bodies responsible**

MITECO and MCIN.

### Measure 1.13. Decarbonisation of the maritime transport

#### a) Description

Maritime transport is a key element in the global economy because of its influence on international freight transport and supply chains. It accounts for 75 % of external trade and 31 % of intra-EU trade, in terms of volume. This accounts for 11 % of CO<sub>2</sub> emissions from transport and between 3 % and 4 % of total EU emissions. According to the International Energy Agency<sup>63</sup>, in 2021 international shipping contributed approximately 2 % of global CO<sub>2</sub> emissions.

At national level, according to the Spanish Transport and Logistics Observatory (OTLE), out of the 499,5 million tonnes transported in 2021 within the Port System of State Owners, more than 88 % were in foreign navigation.

The decarbonisation process of this sector has many specific characteristics, 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, and international competition, which require differentiated treatment. The sector is currently almost entirely dependent on fossil-based energy sources, making its progressive decarbonisation key to the energy transition.

The International Maritime Organisation adopted in 2018 the initial IMO Strategy on the reduction of greenhouse gases from ships, which sets a target of reducing carbon intensity in international shipping **by at least 40 % by 2030** and pursuing efforts **to 70 % by 2050**, as well as a reduction in total greenhouse gas emissions **by at least 50 % by 2050 compared to 2008 levels**.

The Fit for 55 package includes several proposals to advance the decarbonisation of maritime transport, including:

- Proposal for a Regulation on the use of renewable and low-carbon fuels in maritime transport (known as the FuelEU Maritime Regulation), with the aim of increasing the uptake of sustainable fuels by ships to reduce their environmental footprint. The proposal includes a target of reducing the average annual greenhouse gas intensity for marine energy of **2 % by 2025, 6 % in 2030** and a **75 % reduction by 2050 compared to 2020**, as well as the obligation to connect to the shore-side electricity grid, among other obligations.
- Inclusion of maritime transport emissions in the EU Emissions Trading System.
- Proposal for a Regulation on alternative fuels infrastructure to provide alternative sources of energy supply to ships in ports. The proposal includes a target that at least **90 %** of container ships and passenger ships should have access to shore-side electricity supply and that in most inland ports there should be at least one power supply facility by 2030.
- Proposal for a Council directive restructuring the Union framework for the taxation of energy products and electricity.

Meeting the objectives 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 renewable fuels of both bio-based origin (advanced biofuels, biogas) and non-biological (renewable hydrogen) origin.

#### 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) Mechanisms for action

The following mechanisms are foreseen in this area:

- **Strategic framework. Port system of general interest**  
This document, approved in 2022, sets the direction for the transformation of Spanish ports: more sustainable, connected and innovative towards 2030. The scope and content of the

<sup>63</sup> IEA (2022), *International Shipping*, IEA, Paris <https://www.iea.org/reports/international-shipping>, License: CC BY 4.0

Strategic Framework have been designed in coherence with the ‘Safe, Sustainable and Connected Mobility Strategy 2030’.

- Implementation of the obligations stemming from the FuelEU Maritime Regulation, in particular those seeking 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’s International 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.
- In March 2022, “PERTE for the naval industry” was adopted, which will drive transformative projects in the shipping value chain. This PERTE has synergies with the “PERTE for Renewable Energy, Renewable Hydrogen and Storage” (PERTE EHRA) and includes instruments related to adaptations in port facilities and hydrogen-powered mobility in the maritime sector.
- Law 7/2021 of 20 May on climate change and energy transition addresses the reduction of emissions in the maritime transport sector through the integration of renewable energies and the setting of supply targets for biofuels and other renewable fuels of non-biological origin. It also sets out the need to adopt measures to reduce emissions from fossil fuel consumption in maritime transport and in ports, so that by 2050 all those within the competence of the State produce zero direct emissions.
- Penetration of advanced biofuels in the short term.
- Development of early stage 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 in the machinery used in ports and cargo terminals.
- Promoting public-private partnerships that seek the exchange of information and knowledge between all actors, international, European and national regulatory monitoring, joint technological development and the creation of alliances for the decarbonisation of the sector.

#### d) Bodies responsible

MITMA, State Ports 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 strategic sector for economic development through its role in tourism and trade.

Greenhouse gas emissions from the aviation sector have increased annually since the 90s with a significant decrease in 2020 and beyond due to COVID-19. In this context, the recovery of international air mobility is expected to be rapid, with the International Civil Aviation Organisation estimating an annual growth of 3 % in European air traffic by 2050 for passenger transport and 2.4 % for freight transport.

As the development of alternative propulsion technologies and aircraft (e.g. electric aircraft) has not yet matured enough to be available for commercial operations in the next decade, sustainable aviation fuels (Sustainable Aviation Fuel (SAF)) are considered to have the greatest potential to deliver emission reductions in the short term, with many technological routes for their production. On the other hand, RFNBO and especially renewable hydrogen are a very promising decarbonisation alternative in the medium and long term, with the application of renewable hydrogen for the manufacture of synthetic fuels, such as biokerosene, particularly relevant. The gradual introduction of SAF in air transport will represent an additional cost for airlines and ultimately for travellers, because their production has higher costs than fossil fuels.

Transport electrification is detailed in the Energy Efficiency section of this Plan, so this measure focuses on advanced biofuels.

The Fit for 55 package includes several proposals to reduce emissions from the transport sector. For aviation, it includes proposals to strengthen the EU Emissions Trading System and increase the use of alternative fuels in aviation, and the proposal to increase the deployment of alternative fuels infrastructure.

To promote the uptake of the production and use of such fuels, the Commission presented the Sustainable Air Transport Initiative ReFuelEU Aviation in the Fit for 55 package. The proposed new rules oblige fuel suppliers to supply an increasing share of sustainable fuels as part of the fuel supplied at EU airports. The proposal also aims to address fuel transportation practices, which consist of loading more fuel than is necessary for the safe operation of a given flight at airports where it is cheaper.

Article 13 of Law 7/2021 of 20 May on climate change and energy transition states that the necessary measures will be taken to achieve the objectives of integration of renewable energy and supply of alternative fuels in transport, with particular emphasis on advanced biofuels and other renewable fuels of non-biological origin in air transport, including synthetic fuels in the manufacture of which only raw materials and energy of renewable origin have been used.

Progress in the penetration of FAF consumption requires a specific boost to its production, which is still very small. In some cases, this is due to the limited availability of some of the raw materials involved and, in others, to the low level of technological maturity of some of the processes required to manufacture these types of biofuels. The mechanisms proposed in this section aim at reducing the price differential between FAF and conventional aviation fuel in the future.

**b) Objectives addressed**

Penetration of renewable energies in the air transport sector, both in aircraft and in airport infrastructure.

**c) Mechanisms for action**

The following mechanisms are foreseen in this area:

- Implementation in Spain of the obligations arising from the ReFuelEU Aviation initiative.
- Establishment of annual targets for the integration of renewable energy and the supply of alternative fuels in air transport, in application of Article 13 of Law 7/2021 of 20 May 2003 on climate change and energy transition.
- Integration of FAF as a fuel eligible for the obligation to sell or consume biofuels.
- Establishment of specific targets for the consumption of biofuels, advanced biofuels and synthetic fuels of non-biological origin in aviation (sustainable aviation fuels, FAS) and obligations for fuel suppliers to supply blended fuel with a minimum share of FAF at all airports.
- Aid programme for FAS production facilities.
- Promotion of the consumption of labelled biofuel blends through measures to provide this possibility in aviation supply centres and adapt the certification system to specifically collect FAF.
- Establish obligations for airlines departing from or going to EU airports to carry a minimum amount of bunkering fuel in the EU.
- Implementation of PRTR measures, on support for the deployment of alternative fuels at airports and on air transport sustainability, as well as the objective of the Aerospace PERTE to empower industry in cere-emission technologies and systems for aeronautics.
- Implement the measures of the Hydrogen Roadmap related to the aviation sector, such as encouraging the development of synthetic kerosene production plants produced from renewable hydrogen, analysing the re-design of aircraft to use synthetic fuels from 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) Bodies responsible**

MITECO and MITMA.

### 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 hard-to-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, preferably from waste from different sources and mostly composed of methane. Biogas can also be obtained by gasification of biomass or by capturing it in landfills. Biogas from waste is the renewable gas that has primacy in the short and medium term, due to technological development aspects, available potential and production costs. Once enriched to biomethane, it can have the same uses and users as consumers and use the same infrastructure as natural gas<sup>64</sup>, allowing it to move immediately through a renewable alternative. It is particularly interesting to decarbonise demand, usually linked to thermal uses in industry, which is difficult to decarbonise with other renewable energy sources. 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 area.

Biogas, in terms of GHG emission savings, achieves not only the reduction of 100 % renewable fuel<sup>65</sup>, but also an additional reduction in non-energy emissions (mainly CH<sub>4</sub>), associated with better management of municipal waste, sewage sludge, and agricultural and livestock waste as well as from the agri-food industry.

The use of biogas in Spain is far below the existing potential and far 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. However, Spain 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 and energy transition, the Spanish Government adopted in March 2022 a **Biogás Roadmap**, which sets out a series of regulatory and sectoral measures, among others, for the deployment of this energy in Spain and provides for minimum targets for 2030 in line with the current NECP. This Roadmap focuses on biogas produced by anaerobic digestion of different waste raw materials from different origins, prioritising its direct use based on technical, environmental and economic criteria.

Subsequently, the European Commission's Communication (REPowerEU Plan) of 18 May 2022, with its aim of rapidly reducing the EU's dependence on Russian fossil fuels by accelerating the clean energy transition, highlighted the important role biomethane can play in this regard as an alternative to fossil-based natural gas and has set an ambitious indicative target of producing biomethane at 2030 of 35 bcm per year in the EU as a whole, accounting for approximately 8.5 % of annual natural gas demand in the EU.

#### b) Objectives addressed

Promotion of the production and consumption of biogas and, in addition, of upgrading to biomethane.

#### c) Mechanisms for action

- Simplify and coordinate between different Autonomous Communities the processing and authorisation of biogas and biomethane production plants and other infrastructure associated with their consumption or injection into the existing gas network.
- Clarify the rules applicable (energy, environmental, agricultural, industrial, waste treatment, land use, land-use planning and water management) in the various territorial areas (European, national, autonomous and local).
- Facilitate and streamline procedures for connection to the existing gas network.
- Establish binding annual targets for the penetration of biomethane in the sale or consumption of natural gas, in line with the provisions of Article 12 of Law 7/2021 of 20 May 2003 on climate change and energy transition.
- Incorporating biomethane into the Biofuels Promotion Mechanism (SICBIOS)
- Promotion of biogas projects under the PRTR, in particular in transition areas

<sup>64</sup>Given the high global warming potential of methane, it is critical to consider fugitive emissions of methane from different *upgrading* processes, as processes that do not achieve very high methane recovery yields will have significantly higher GHG emissions than other renewable gases such as biogas.

<sup>65</sup>Biogas (CH<sub>4</sub>+ CO<sub>2</sub>+ other traces) is obtained from anaerobic digestion of the biodegradable fraction of livestock waste, sewage sludge etc.

fair.

- Implementation of the system of guarantees of origin for renewable gases, as well as the register of installations and associated producers.
- Develop a greenhouse gas emissions reduction calculator

**d) Bodies 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 gas provides a medium- and long-term solution in the decarbonisation of hard-to-electrification sectors, such as high-temperature intensive industry or long-distance heavy transport. In addition, its status as an energy carrier gives it great potential as an instrument for energy storage and sector integration.

Hydrogen is not in the free state in nature, but is combined in different molecules such as water or hydrocarbons. Hydrogen produced from fossil sources such as natural gas (grey hydrogen) has been consumed mainly by certain industries such as petrochemicals and fertilisers.

One of the most relevant issues for the competitiveness of renewable hydrogen against grey hydrogen is its cost of production, which is mainly determined by the cost of renewable electricity consumed for electrolysis. In this regard, countries with a better renewable resource have a comparative advantage in becoming producers of renewable hydrogen, as is the case in Spain.

In this way, and in implementation of the current NECP 2021-2030, as well as 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**, which sets 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 measures, of a regulatory and sectoral nature, inter alia, for the deployment of this energy carrier in Spain and ultimately forming a country project through which 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 the ERHA PERTE.

### b) Objectives addressed

Development of the renewable hydrogen value chain in Spain.

### c) Mechanisms for action

- Development of the measures contained in the Hydrogen Roadmap.
- Development of the national regulatory framework for hydrogen through the incorporation and integration of the new European legislation amending the natural gas legislation.
- 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 gas and hydrogen.
- Administrative simplification and removal of regulatory barriers.
- Lines of support for renewable H2 value chain projects under the PRTR, including 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 situation.
- 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: (a) the national development of high-power electrolyzers; (b) the exclusive financing of projects in the renewable hydrogen value chain in the SIECIs; (c) promoting R & D through the CDTI; (D) strengthening the role of the National Hydrogen Centre; (e) promoting R & D & I in recycling technologies for electrolyzers, fuel cells and other systems; (f) fostering the development of hydrogen-based heat production technologies.
- **Specific support within ERHA PERTE**
  - **Programmes of incentives for the innovative value chain and knowledge of renewable hydrogen** under the PRTR, by means of Order TED/1444/2021. The aim is to support SMEs and technology centres to improve technical knowledge and productive capacity to develop large-scale electrolysis, to develop and improve the efficiency of electrolyzers and fuel cells with a focus on heavy transport equipment manufacturing

- centres across the value chain, etc.
- On 22 December 2021, the regulatory bases of the **programme of incentives for pioneering and unique renewable hydrogen projects (Pioneering H2 Programme)** were approved by Order TED/1445/2021. The pioneering H2 programme aims to boost the development of integrated localised production and consumption projects for local hydrogen production and consumption in hard-to-decarbonise sectors such as industry or heavy transport. Given the success of the first call, a second call was published in May 2023.

**d) Bodies responsible**

General State Administration (MITECO, IDAE, MINCOTUR).



### Measure 1.17. Plan for the repowering and reengineering of existing generation projects electricity from renewable energy sources

#### a) Description

**Between 2021 and 2030, approximately 22 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 their energy contribution, it is necessary to provide for a specific plan for the technological renovation of these installations.

The **overhauling or repowering** of existing projects allows renewable resources to be better utilised through the replacement of obsolete or ageing systems with new ones that offer greater power or efficiency. 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 available grid connection capacity. In addition, updating by systems complying with the most recent 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 in that node.

In addition, at environmental level, re-engineering, repowering and hybridisation can have a lower impact by concentrating renewable generation in a particular 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 reprocessing is in itself an opportunity to improve the integration of the wind farm landscape and the environment in the sites already occupied, 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 avifauna and environmental values of the environment. In addition, the new technology makes it possible to optimise the use of electricity grids, thereby also contributing to greater renewable penetration. Finally, the process of repowering or remachining will have a knock-on effect on the consolidated value chain of wind energy in our country.

In addition, in the repowering of wind farms, the application of 'excellence' circular economy criteria should be promoted in the dismantling of existing wind farms, 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, although 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), it is essential to encourage the achievement of advances and commercial solutions to enable the recycling of wind turbine blades, and other components of composite materials that do not have sufficiently established recycling processes, so that the conventional reference process to be avoided as a 'sine qua non' condition would be landfilling.

For the mini-hydraulic sector, the technological and environmental renewal of installations that have been in operation for many years and with very old equipment will make it possible, in addition to maintaining existing hydroelectric capacity and improving efficiency by introducing state-of-the-art equipment to replace obsolete equipment, to adapt existing hydroelectric uses to the new environmental or hydrological conditions by means of measures aimed at protecting or improving ecosystems and adapting and integrating installations into the territory.

#### b) Objectives addressed

Development of renewable energies through the renewal of old renewable parks to maintain their capacity.

#### c) Mechanisms for action

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 provides that the repowering of renewable projects shall be subject to a simplified and

rapid permit granting regime of no more than one year. Given that existing projects have already been subject to administrative processing prior to authorisation, it is necessary to assess, inter alia, the possibility of applying the following simplifications during their processing, while ensuring that the infrastructure is properly integrated into the territory: 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 has already been submitted during the processing of the existing installation; reduction of processing times in the environmental impact assessment; shortening the time limits for reporting to other public administrations for administrative authorisation and the transfer of technical conditions for project approval; and simplification of the requirements for accreditation of the applicant's capacity.

In the specific case of the environmental impact assessment, the existence of common cases between potential repowering projects makes it advisable to establish relatively homogeneous criteria and conditions for the processing of repowering projects.

- **Opening of coordination tables with the Autonomous Communities**

To achieve the administrative simplification described above, it is essential for the regional governments to be actively involved due to their competences in urban planning and the environment, and their degree of knowledge of the situation in each territory.

- **Support mechanisms for technological renovation of existing renewable installations**

In line with the 'Circular Repowering' Programmes under Component 7 'Deployment and Integration of Renewable Energy' of the PRTR, these mechanisms will contribute to the deployment and integration of renewable energies, through reengineering (with a power lower or equal to that of the existing installation), repowering (leading to an increase in power), technological and environmental renovation and the construction of innovative recycling facilities, such as the recycling of blades at the end of the life of wind farms.

It is proposed to grant, on a competitive basis, aid for investment projects in this type of project for the technological renovation of existing renewable installations.

Specifically, as part of the 'circular repowering' programme, Order TED/1071/2022 of 8 November has been published, laying down the regulatory bases for **aid programmes for investment in the repowering of wind turbines, in the technological and environmental renovation of mini-hydro power stations of up to 10 MW and in innovative installations for recycling wind turbine blades**. The first call for this grant programme was formalised in November 2022, with a budget of EUR 222,5 million.

- **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 once the existing concessions have ended, it is necessary to legally establish the procedures and time frames applicable to these facilities.

#### d) **Bodies 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 renewable technologies for 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 proposal for a regulation called the net-zero industry act sets a necessary objective to ensure and lead the green transition at European level: at least 40 % of the annual deployment needs of strategic net-zero emission technologies are manufactured in the European Union. To this end, it is necessary to reverse the clear importing nature of the technologies needed to decarbonise the energy system in the European Union.

In general in Europe, and in particular in Spain, the import volume of photovoltaic modules significantly

exceeds that of exports. The PV market is currently dominated by Asia (more than 90 % of the power produced). Such dependence may compromise energy security and the future availability of the large volume of power needed to undertake the current decarbonisation process. In addition, the production of such modules should be made using the best available technology and in the most sustainable way by avoiding the emissions that occur many times 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 to start investing in the production of photovoltaic modules at national level.

Furthermore, in accordance with the EU Solar Strategy, the European Commission intends to propose in the first half of 2023 two mandatory internal market instruments that would apply to solar photovoltaic modules, investors and systems sold in the EU: an **Ecodesign Regulation and the Energy Labelling Regulation**.

#### b) Objectives addressed

- Industrialisation of the value chain of decarbonisation technologies to reduce technological dependence from outside.
- Strengthening the capacities of domestic industry along its entire value chain in the different technologies 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 photovoltaic systems by promoting the use of photovoltaic systems with a lower carbon footprint.

#### c) Mechanisms for action

The following mechanisms are foreseen:

- **Development of the mechanisms for investment included in the addendum to the PRTR under REPowerEU for the national development of the renewable technologies value chain.**

The development of innovative renewables and certain energy storage technologies makes it necessary to boost technological development in the early stages in order to gain a differential advantage in the earlier designs of these technologies, and especially at the innovation stage, i.e. at the early stages of the value chain, including the phases of R & D & I capabilities, design, manufacturing and logistics.

The objective of this investment would be to support the implementation or upgrade of manufacturing facilities for renewable generation, storage and generation/storage/distribution/consumption components and systems of renewable hydrogen. As well as any other facility located at any link in the value chain, design, manufacturing, logistics, storage, recycling, R & D & I capabilities and any other facility falling under the value chain concept.

For illustrative purposes, it may include support for the implementation of photovoltaic panel factories, larger or technologically improved wind turbine blades, energy battery factories or other innovative storage systems, better performing electrolyser plants (going beyond the state of the art), fuel cell factories, R & D & I facilities, design, improvement of logistical capacities both on land and at sea through port facilities, etc.

It may also include the development and validation of more advanced prototypes of key systems/equipment/components within the renewable hydrogen value chain in a broad sense (i.e. production of storage/distribution/consumption), storage systems or renewable energy generation systems.

In this regard, a Manifestation of Interest (MDI) has recently been held under the PRTR, with the aim of gathering information, proposals and ideas from projects from companies, associations, and from all civil society in order 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 through this initiative will be used to propose the design of aid lines with an additional EUR 1.000 million provided for in the More Energy Security Plan (Plan + SE) to strengthen the value chain in the energy transition, in line with the objectives of the ERHA PERTE.

Furthermore, in the Territorial Plan of the Just Transition Fund of Spain, which focuses on the provinces of A Coruña, Almería, Asturias, Balearic Islands, Cádiz, Córdoba, León, Palencia and Teruel, it 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 the electric and connected vehicle.**

To this end, the call for applications for aid for integrated actions in the industrial chain of electric and connected vehicles 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.
- Enforcement of the new mandatory internal market instruments that would apply to solar photovoltaic modules, investors and systems sold in the EU: an **Ecodesign Regulation and the Energy Labelling Regulation that will improve** the efficiency, durability, reparability and recyclability of products and systems.

### (c) Managers

General State Administration (MITECO, MITMA, IDAE).

#### Measure 1.19. New business models for the energy transition

##### a) Description

The transition to climate neutrality represents a paradigm shift of the traditional energy model towards a decarbonised energy system based primarily on renewable energy, where citizens take a proactive role in the entire energy value chain. The distributed, variable and stochastic nature of renewable generation requires the gradual adaptation and digitalisation of grid infrastructures, as well as the deployment of tools and services that provide flexibility to the electricity system as a whole to ensure security and quality 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 that allow its activities to grow to the necessary maturity. These mechanisms should therefore become the intermediate link between the generation of knowledge and the deployment of systems and services on a commercial scale. It is therefore a question of strengthening the capacities of the value chain by supporting new lines or manufacturing capacities of components and public investment in technology-based companies (start-ups) or SMEs to boost their growth, among other actions.

For all these reasons, since the adoption of the NECP in 2020, various measures to support the new business models for the energy transition have been implemented in the PRTR through Investment 3 of its Component 8 and its subsequent development in the ERHA PERTE, in areas ranging from the regulation and creation of test ecosystems such as regulatory sandboxes to the definition of aid lines for companies developing this type of activity. This new version of the NECP thus endorses the following objectives and measures.

##### b) Objectives addressed

The key objective of this measure is to boost projects of new business models that provide solutions to the challenges posed by the energy transition, related to innovation, the provision of flexibility services that allow for the further integration of renewable energy, and thus support the decarbonisation of the system, or the promotion and development of new companies providing innovative solutions for the energy transition.

Specific objectives include:

- Boosting new innovative business models and mechanisms that give flexibility to the energy system, such as energy aggregators, or other forms of demand-side 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 making storage an enabling element for further integration of renewables into the energy system.
- Support for new business projects or innovative initiatives in the field of energy.
- Enhanced deployment of storage along the whole 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 sandboxes or regulatory test beds that allow new solutions to be taught in controlled environments prior to their widespread deployment.

### c) Mechanisms for action

Both the ERHA PERTE and the PRTR provide for different mechanisms of action to which this Plan provides continuity. 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-side management projects targeting different consumer profiles.
- Deployment of storage along the whole value chain.
- Innovative services related to energy storage and management boosting the active role of consumers.
- Support for projects launched by start-ups or innovative energy initiatives.
- Training and capacity building of talent.

Finally, the mechanisms envisaged to guide the above actions include:

- Calls for applications for aid to support the development of new business models for the energy transition under Order TED/1359/2022 of 28 December approving the regulatory bases for granting aid for projects of new business models in the energy transition under the PRTR. This basic order covers the financing of innovation projects, for the decarbonisation of the energy system and the launch and operation of start-ups. They also include the possibility of financing sandbox projects.
- Public-private partnership mechanisms such as agreements.
- Direct investment in new initiatives, which may take different forms, for example investment in social capital of start-ups or support for innovative actions aimed at boosting or innovating new business models linked to flexibility in the energy system or actions that promote the decarbonisation of the energy sector and the improvement of the integration of renewable energies.
- Mechanisms for training and training of professionals.
- Development of the regulatory test bench set out in Royal Decree 568/2022 of 11 July 2007 establishing the general framework for the regulatory test bank to promote research and innovation in the electricity sector.

It should be noted that the PRTR is allocated EUR 156 million in Investment 3 of Component 8 for the development of these measures.

### d) Bodies responsible

MITECO, IDAE and, where appropriate, the Autonomous Communities.

### Measure 1.20. Promotion of bilateral procurement and encouragement of forward markets for renewable electricity

#### a) Description

Across 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 ways to obtain a 100 % -renewable electricity supply is to enter into a bilateral purchase agreement 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 without 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, the futures markets in the Iberian Peninsula, both organised and over-the-counter, have not been highly liquid. One of the reasons for this situation is that renewable technology, cogeneration and waste installations covered by the specific remuneration scheme, which contribute approximately 38 % of electricity demand, establish strategies for selling their production on the day-ahead and intraday market without participating in the forward markets.

On the other hand, the lack of liquidity in forward markets is aggravated by the spread over time of the war in Ukraine and the current environment of uncertainty, high prices and volatility in energy markets, which make the cost of collateral required for forward procurements incorporating an additional risk premium more expensive. This makes it necessary to adopt measures to promote the liquidity of the long-term markets, in particular renewable sources, so as to provide greater stability of electricity prices.

In this regard, the European Commission's new proposal, launched on 14 March 2023 for reforming the electricity market, advocates forward contracting as one of the solutions that will enable suppliers and consumers to protect themselves against the risk of future price volatility, providing certainty and stimulating investment.

Furthermore, the procurement of energy efficiency measures in the public sector is addressed separately in Measure 2.17.

#### b) Objectives addressed

Development of renewable energies and participation of new players, by promoting the procurement of 100 % renewable electricity.

#### c) Mechanisms for action

In addition to the mechanisms provided for in the specific renewable energy procurement measures and promoting the proactive role of the consumer, mechanisms to encourage long-term bilateral contracting with renewable energy producers, such as instruments to reduce the risk of such operations or minimum contributions for certain energy-intensive consumers, will be analysed.

Progress will continue to be made in the implementation of mechanisms to promote long-term renewable electricity procurement, in line with the European Commission's proposal and in accordance with the resulting new regulation.

#### d) Bodies 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 provides added value over and above its energy 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 just transition. Biomass is therefore 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 that facilitate the connection and achievement of both objectives: just transition and circular economy.

Article 27 of Law 7/2022 of 8 April 2003 on waste and contaminated soil for a circular economy does not generally 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 accessible for removal and subsequent management. The application of this law may lead to increased use of these resources for various applications between them and significantly for energy applications. For heat and electricity with biomass, it is expected that the greatest development will be produced **from forest or agricultural biomass** (in industry in general already used).

#### **b) Objectives addressed**

Penetration of renewable energy sources and displacement of fossil fuels, involvement of new players and innovation.

#### **c) Mechanisms for action**

As regards the specific mechanisms to be developed, the following points out:

- **Promotion of energy from biomass with sustainability criteria**
  - Regulatory development throughout the biomass value chain.
  - Strategy for the energy use of pruning in the agricultural sector.
  - Adaptation to air quality obligations in both new and existing biomass installations.
  - Promoting certification and the principle of proximity to origin in the use of biomass.
  - Dissemination and promotion of high-efficiency and low-emission local heating equipment.
  - 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 waste. The penalty for landfilling was one of the measures envisaged in the original wording of the NECP.
  - Harnessing biomass in public facilities.
  - Royal Decrees 477/2201 and 1124/2021, within the framework of the PRTR, contribute to supporting biomass installations for thermal uses in all potential consumer sectors.

#### **d) Bodies responsible**

General State Administration and Autonomous Communities.

### Measure 1.22. Unique projects and strategy for sustainable energy on islands

#### • **Description**

All technologies, including energy technologies, must go through a process to verify their effectiveness and availability known as the 'valley of death' before their widespread implementation. 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 it because of the lack of investment (public and private) needed to make the leap forward from the pilot project phase, which should encourage public administrations and the private sector to join forces through the formation of consortia.

The details of the innovative technologies that will be developed 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 noted that the uniqueness not only applies to innovative projects, but also relates to the challenges to be addressed. For example, geographical (insularity) or market, such as high-temperature

geothermia for large-scale electricity generation, which does not have a market in Spain despite being mature technology, or the case of offshore wind, which, if developed around island territories, would comply with the two main aspects of uniqueness sought. In addition, it has been identified that it would be useful in the short term to use these island territories as tractors and ‘spearheads’ for the deployment of offshore wind, coupled with the incorporation of storage requirements and support for the electricity system, with a greater impact on the reduction of GHG emissions 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.

- **Objectives addressed**
- Market development for new renewable energy technologies.
- Implementation and development of test banks to identify barriers and solutions, establish criteria and regulations, and develop, develop or integrate new renewable energy projects into the market.
- Boosting flexibility and demand management, in parallel with the development of storage systems.
- **Mechanisms for action**

These include the following:

- **Plan to develop unique projects**

Programme aimed at the participation of IDAE in unique or demonstrative projects where the Institute’s contribution or public-private partnership is of particular relevance. The support system best suited to the development of the project 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 testing field for energy transition technologies or policies that can then be exported to the continent. To this end, the General State Administration will promote sustainable energy strategies in the Balearic Islands and the Canary Islands, in cooperation with the respective regional and island governments, which in turn allow the corresponding energy cost overruns to be reduced. In particular, the aim will be to ensure that renewable energy is properly integrated into the territory and that it can provide firm capacity and other services, such as frequency stabilisation, black-start capability in no-voltage conditions and zero-emission mobility, and to integrate the change of energy model into the water cycle.

On 16 February and 14 March 2022, the programmes ‘Strategy for Sustainable Energy 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.

The Sustainable Energy Strategy in the Canary Islands is based precisely on the NECP, and in particular on its purpose of reducing the islands’ energy dependence and promoting the integration of renewables in 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 Canary Islands’ energy transition in the coming years, thus enabling progress in the decarbonisation planned for 2040, in accordance with the Canary Islands Climate Emergency Declaration approved by the Government Agreement in August 2019 and ratified by the Canary Islands Parliament in January 2020.

For its part, the Investment Plan for the Energy Transition of the Balearic Islands aims to promote an Agenda for Energy Transition on the Islands. This Plan aims to achieve a socially just energy transition, accelerate this transition in the Balearic Islands and address unique challenges of this territory that have not been addressed in other aid lines. The plan is endowed with EUR 233,34 million and is divided into three main axes (energy transition finance offices, aid to boost the energy transition and investments in innovative projects), which are implemented in six programmes.

- **Royal Decree 451/2022 of 14 June 2007 regulating the direct granting of aid to finance 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 and EUR 301,7 million respectively) for the following actions:

- a) Revitalisation of the sustainable energy programme on islands. Support for energy transition actors by setting up or managing offices for energy transition on islands, whose functions may include support for 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 conferences.
  - b) Aid programmes for new renewable installations aimed at promoting installations that can provide a guarantee of capacity, unique projects and sustainable energy in 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, in particular the development of projects on islands that promote demand-side or supply-side flexibility measures, as well as any other action to facilitate the integration of renewables into the island system.
  - d) Clean Energy for EU Islands support programme by promoting investments in renewable projects in line with the analysis of proposals and results of the expression of interest and the European programme referred to above.
  - e) Aid programme for sustainable storage projects with new renewable energy generation power, enabling their deployment to optimise the management of renewable generation.
  - f) Initial promotion of energy communities, management support for the creation of new communities and development of transition agendas for each island, through dissemination, support, advice and promotion of specific actions to encourage the development of projects in these communities.
- **Establishment and management in IDAE of an office for clean energy and smart projects for islands which inter alia:**
    - a) provide technical assistance to a network of offices in the islands and to regional and local governments
    - b) develop mechanisms for participation, communication, training, information and services between stakeholders and citizens
    - c) design and implement specific lines of support for projects on islands
    - d) identify and disseminate best practices.
  - **Centrally managed aid lines under the PRTR**
    - Demand/Storage Management
      - a) Promotion of renewable energy actions integrating demand-side management systems and/or storage solutions, through specific programmes for islands to direct national or European funds.
      - b) Implementation of sustainable storage projects with new renewable energy generation power, enabling their deployment for optimisation of renewable generation management or stand-alone. In this area, the first call for aid for innovative projects for hybrid energy storage with electricity generation facilities, published under Order TED/1177/2022 of 29 November approving the regulatory bases for granting aid for innovative hybrid energy storage projects with electricity generation facilities from renewable energy sources under the PRTR, includes a specific budget for projects in the Balearic Islands (EUR 6 million) and the Canary Islands (EUR 20 million).
    - Initially encouraging the promotion of energy communities, the management and creation of new communities and the development of transition agendas for each island, through dissemination, support, advice and promoting specific actions to encourage the development of projects in these communities.
    - Aid mechanisms for the development of mid- and high-enthalpy deep geothermia 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 to reduce the energy dependency of these territories, as set out in Measure 3.3 of this Plan.

- **Responsible**

General State Administration (MITECO, IDAE), island Autonomous Communities.

### Measure 1.23. Energy Communities

#### a) Description

European legislation aims to boost the role of citizens as a driver of the energy transition by defining 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).

In this measure, the term ‘energy communities’ covers the two types of entity.

Energy communities are a crucial element for the just and inclusive component of the energy transition. This is shown by the fact that one in two energy community pilots from the first two calls under the EC programme are implemented in whole or in part in municipalities of the Demographic Challenge, that 86 % of all partners and partners in these energy communities are natural persons or that one in ten of the projects seeks to address 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 authorities 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 figures is that, while the objective of the renewable energy community is to carry out projects of any nature (electricity, thermal or transport), provided that the energy origin is renewable, the citizen energy community has planned to cover any project related to the electricity sector, including distribution, supply, consumption, aggregation, energy storage, provision of energy efficiency services or the provision of recharging services for electric vehicles, or other energy services to its members.

In particular, the Renewable Energy Communities are listed as a new feature of the electricity sector in Article 6 (j) of Law 24/2013 of 26 December 1997 on the Electricity Sector, in application 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.

Partners in renewable energy communities should be located in the vicinity of renewable energy projects owned and developed by those legal entities.

Among other measures, an assessment of existing barriers and their potential for development will be carried out. It should also be ensured that they can produce, consume, store and sell renewable energy, including through renewable power purchase agreements, as well as access all appropriate energy markets, both directly and through aggregation.

#### Objectives addressed

Facilitate the participation of citizens, SMEs and local authorities in the energy transition.

#### b) Mechanisms for action

- The PRTR provides for the promotion and development of energy communities through a targeted reform under Component 7 “Deployment and Integration of Renewable Energy”. In particular, reform C7.R3 “Development of Energy Communities” of this component articulates a roadmap of energy communities that ultimately aims to create and consolidate them, 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 trigger participatory, informative and informative processes, as well as the legal constitution of these figures. The third one implements, in addition to other actions, the promotion of demonstration projects with geographical, technological and social diversity in order to remove barriers to market entry and validate business models and possible technical or social innovations. This promotion includes the possibility of formalising aid lines for investment therein. The development of these phases will be complemented by the creation of Community Transformation Offices, which will support the dissemination of these figures, as well as the support and advice of the actors seeking to set them up.

The first two calls under the EC programme, with a budget of EUR 40 million, have been resolved by awarding aid to 74 energy community projects. A third and fourth call for proposals has been launched in 2023 for an additional EUR 40 million.

- The appropriate regulatory framework will be developed to define these legal entities and encourage their development, in particular to comply with the Internal Market and Renewable Energy Directives.
- Removal of barriers and promotion of 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 activities; supporting and advising energy communities in their formation processes through technical, administrative, economic, social or legal consultancy linked to the implementation of specific projects for the establishment and operation of energy communities.
- For the removal of barriers related to the development of energy communities and their projects, measures will also be deployed to facilitate their legal constitution and to reduce the risk to the early stages of their development (e.g. administrative, technical and financial feasibility studies).
- Establishment of a knowledge and experience network, 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 collaboration mechanisms between different types of actors and territorial areas and develop in a coordinated way instruments to support and promote energy communities.
- Promotion of energy community demonstration projects covering as wide a case as possible, identifying and enabling viable business models for the different types of projects, enabling them to be developed on a large scale.
- Training and capacity building programmes so that energy communities can rely on human and technical resources to identify, process, implement and manage projects and mobilise the necessary investments.
- Analysis of the establishment in IDAE of an office for the promotion and support of energy communities which, among other mechanisms, designs and implements specific lines of guarantees or funding; provide technical, administrative, economic, social or legal assistance where the office network services do not reach; promote the joint procurement of equipment and services; identify strategic lines of action for the deployment at the level of energy communities and implement the necessary measures for their development.

### c) Bodies responsible

MITECO and IDAE, in coordination with other ministries with wider social economy scope.

#### Measure 1.24. Citizenship at school

##### a) Description

Citizens are at the heart of the energy transition given that: (1) the success of the energy transition is very much dependent on the social acceptance of projects, (2) it can stimulate policy adoption and enhance greater corporate social and environmental responsibility, (3) it participates in the jobs generated and (4) it can consume, finance, invest, sell, exchange, manage and produce renewable energy. The transition to a decarbonised energy system is a major technological and societal challenge, 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 Eurobarometer 2022, Spain is the country most concerned about climate change across the European Union with a total of 90 % of the population that considers it “a very serious problem”. In addition, this concern is deepened in the new generations: 4 out of 5 young people are interested in environmental issues. Around 80 % of young people are mostly in favour of policies promoting recycling, banning plastic packaging in supermarkets and incentivising renewable energy. It is therefore necessary to translate this social concern into participation mechanisms. Proof of this concern and willingness to participate is precisely the success of the programme to support self-consumption and the strong deployment it has experienced in recent years.

According to a 2017 study, 66.30.9 % 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,

<sup>66</sup>Collaborative energy. The power of citizens to create, share and manage renewables; Greenpeace; 2017.

which is distributed to citizens. The financial participation of citizens in renewable energy production projects helps to direct household savings towards financing the energy transition. The above study states that: 12.1 % of respondents would take on the role of investor who invests their savings by participating in renewable energy generation plants directly, without being a co-owner. 16 % would be interested in being the co-owner of 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 energy in the regions, taking part in local development and enabling people to raise awareness or even mobilise 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

- Empower citizens and promote their participation in the energy transition.
- Improve their choice of a 100 % renewable supply 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 to manage their own energy.
- Promote citizen participation in the definition of local, regional and national energy policies.

#### c) Mechanisms for action

The following mechanisms are foreseen:

- **Mechanisms to promote the diversity of actors** and the existence of **participatory citizen projects**. Regulatory mechanisms will be put in place to promote the diversity of actors and the existence of participatory citizen projects, so as to promote both social and territorial cohesion and the just transition and to seize the opportunities of the new decarbonised generation model. See calls for aid for energy communities under the PRTR in the corresponding measure.
  - An accession mechanism shall be established whereby participating 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 reserved for these quotas to be granted to the first applicant and eligible until the energy share is covered. 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 allocated to activities agreed with local actors.
- **Support and crowdfunding instruments adapted to the real environment of cities and rural areas**, including criteria for competition and ensuring local citizen participation either directly or indirectly (i.e. cooperatives, owners' associations/neighbours). Options for the timely aggregation of projects to facilitate, inter alia, access to European support mechanisms (e.g. ELENA<sup>67</sup> or ISCED A68) for the development of renewable projects in general, as well as for green and innovative public procurement tenders, will be explored. As regards rural development, Measure 1.2 pays particular attention to this issue.
- **Promotion of mechanisms for action at municipal level** to promote partnerships or partnerships between municipalities and citizens' groups, given the existing synergies and mutual benefits to be achieved. The municipality can be a strategic advisor by 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, we would draw attention to the DUS 5000 aid programme under the PRTR, which was specifically intended for 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 specific local clean energy projects in municipalities facing demographic challenges (PROGRAMA DUS 5000), as part of the PRTR

<sup>67</sup><https://www.eib.org/en/products/advising/elena/index.htm>

<sup>68</sup> European Climate Infrastructure and Environment Executive Agency

<https://www.eib.org/en/products/advising/elena/index.htm>

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 and sale 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 ensures that consumers are actually paying for renewable energy. In addition, unlike guarantees of renewable origin, the total hourly coverage of the consumer with renewable energy is guaranteed.
- **Public participation in demand management** (individual or aggregated), by means of the mechanisms needed to ensure that tariff structures, tolls and electricity charges are designed to send a positive signal both for active demand management and for reducing consumption. The promotion of demand management in general is promoted 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 transfer it to third parties without hindrance.** With the aim of promoting and facilitating citizen participation in the design and implementation of local, regional and national energy policies, IDAE will work with public administrations and social stakeholders to generate good practices in these processes, as well as their monitoring over time. In order to make citizen activation a reality, there is a need to improve energy literacy and transparency about the information of the energy system. In this direction, work will be carried out with local authorities and civil society to set up information and advisory systems for citizens on their energy, bills, consumption, environmental and social impacts.
- **Monitoring of the alignment of the actions of the NECP with the objectives and recommendations set by the Climate Citizens' Assembly.** In accordance with Article 39 (1) of Law 7/2021 of 20 May on Climate Change and Energy Transition and the Declaration to the Climate and Environmental Emergency in Spain, adopted by the Council of Ministers in January 2020, the Citizens' Assembly for Climate is established with the aim of strengthening the existing participation 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 has been set out in a final report of conclusions, which the Council of Ministers rightly adopted on 11 July 2022, while providing for it to be forwarded to the Congress of Deputies. In its validity, 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) Bodies responsible**

MITECO and IDAE.

### Measure 1.25. Fair 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, as is the case with coal in Spain. During the process of change, it is therefore necessary to support the most affected economic sectors by supporting the adaptation of municipal infrastructure, the business fabric and businesses and people to the new situation.

In order to integrate the just transition into energy transition and decarbonisation policies, the Just Transition Strategy was presented in February 2019 as a solidarity-based accompanying strategy to ensure that people and territories take full advantage of the opportunities of this energy transition, as part of the Strategic Energy and Climate Framework. In addition, the Law on Climate Change and Energy Transition includes the obligation to approve Just Transition Strategies every 5 years to accompany the effects of decarbonisation, and the Institute for Just Transition O.A. is established as the body responsible for coordinating and implementing the relevant measures.

Together with the Just Transition Strategy, an Emergency Action Plan for short-term challenges was adopted: closure of mines, coal-fired power plants and nuclear power plants under closure.

Currently, the closure of coal mining in 2018 adds to the process of shutting down the coal-fired thermal power plants. Of 15 coal-fired power plants active in 2018, only 5 remain in operation and all are in agreement with closure, so it is estimated that around 2025 will be fully shut down. In addition to the closure of nuclear power stations without prior conversion plans.

Work started through the signature of two tripartite agreements between the Spanish government, companies and trade unions:

- The first –*Framework Agreement for a Just Transition of Coal Mining and the Sustainable Development of Mining Areas for the period 2019-2027*– was signed in 2018, together with the Trade Unions Comisiones Obreras (CCOO), the General Union of Workers (UGT) and Unión Sindical Obrera (USO) and the National Federation of Coal Mine Employers to promote the economic recovery and alternative development of mining areas in order to achieve their structural transformation, economic recovery and social well-being. This agreement has a high level of compliance.
- The second – *Agreement for a just energy transition for shut-down 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 revitalisation linked to the deployment of renewable energy and other industrial projects linked to the clean energy transition.

As a key instrument for implementing the actions, the Just Transition Agreements are developed, with the aim of promoting 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 such cases of closure or conversion of installations, as set out in Article 27 and 28 of Law 7/2021 on Climate Change and Energy Transition.

#### b) Objectives addressed

- Maximising the social benefits of the ecological transformation and mitigating the negative impacts that this transition may have on certain territories and people, with no one left behind. To this end, it focuses mainly on the 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 this transition.
- Among the strategic objectives set out in the Just Transition Strategy are:
  - Facilitate exploiting 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 to reduce women’s employment inequalities in the green transition and, on the other hand,

through measures for groups facing particular difficulties

- Provide Spanish public administrations and society with a dynamic and forward-looking observation capacity on the labour market situation and trends with regard to the transformations taking place in the labour market as a result of the green transition.
- Development of Just Transition Agreements as co-governance tools with regional and local authorities to ensure the commitment and coordination of public administrations and propose support instruments for maintaining and creating activity and employment in the regions affected by the energy transition, for supporting sectors and groups with retraining needs, for the establishment of a population in rural areas and for the promotion of diversification and specialisation consistent with the socio-economic context of each area. By involving citizens through public participation channels.

### c) Mechanisms for action

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 entrepreneurial 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 lives and activity in the area.
- Support for affected workers through social aid, vocational training and retraining programmes, job pockets and hiring incentives in the support instruments deployed for businesses and local authorities.
- Promoting the environmental restoration of areas degraded by coal mining, prioritising mining workers affected by closures.
- Support for cultural activities and the enhancement of mining heritage and identity.
- Promoting gender equality, especially taking into account the masculinification of employment in mining regions, 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 support instruments for renewable energy, renewable hydrogen and energy storage; (2) by allocating the power grid access capacity released after the closure of thermal power 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 Agreements in place**, on which work will continue and the deployment of measures will continue: 3 in Andalusia (Carboneras, Puente Nueva o-Valle del Guadiato y Los Barrios); 1 in Aragon; 3 in Asturias (suroccidente, Valle del Nalón and Caudal-Aboño); 4 in Castile-Leon (Leon central Mountains – La Robla, Bierzo-Lazana, Guardo-Velilla and Garoña); 2 in Galicia (Meirama and As Pontes); 1 in Mallorca (Alcudia); and 1 in Castilla-La Mancha (Zorita). Public participation processes involving more than 800 actors have been launched for the development of the Just Transition Conventions and more than 2.000 ideas and proposals have been received. In the agreements that were launched earlier, initiatives that have worked through the agreements or aid granted would create a job similar to that at closure plants.

In line with the obligation set out in Law 7/2021 on Climate Change and Energy Transition, the Just Transition Strategy will be reviewed every 5 years, assessing the impact of the green transition on other sectors of the economy and developing new specific accompanying measures that might prove necessary.

### d) Bodies responsible

Institute for Just Transition O.A (MITECO), in collaboration with the Ministry of Labour and Social Economy; MITMA and MINCOTUR, in cooperation with regional and local governments and employers'



organisations, trade unions and other social organisations.

## Cross-cutting measures to promote renewable energy

### Measure 1.26. Public procurement of renewable energy

#### a) Description

Currently, Framework Agreement 23/2017, signed on 31 July 2018 on the supply of electricity to the General State Administration, its autonomous bodies, the management and common services of the Social Security and other State public entities, and others that are members, provides that the supply of electricity shall have a 50 % guarantee of origin, unless the additional requirements set a higher percentage by the body concerned.

In December 2018, the Council of Ministers approved the Plan for Green Public Procurement and the General State Administration, which sets the target for the procurement of electricity from 100 % renewable sources 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 from renewable sources by means of long-term purchasing agreements that incentivise new installations, as well as innovative ways to enable, inter alia, the installation of self-consumption generation systems in public buildings.

In this context, the Photovoltaic Plan developed by AENA, the Spanish state-owned company that manages public airports in Spain, is worth noting. The plan includes the construction of solar photovoltaic plants that will greatly reduce electricity consumption from the electricity grid at Spanish airports. By 2026, the aim is for renewable sources to provide 70 % share of the energy consumed at AENA's facilities.

In order to make further progress on the decarbonisation path, similar objectives need to be promoted in other public administrations, both autonomous and local, through the dissemination of information, model specifications and calls for 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) Mechanisms for action

- Design and implementation of new framework agreements for the purchase of 100 % renewable energy, as well as the introduction of renewable self-consumption systems in public buildings.
- Analysis of the design and implementation of centralised auctions for the purchase of electricity from new installations from renewable sources in the long term.
- Analysis of the potential of innovative public procurement (see Measure 5.5 of this Plan) for the deployment of public renewables.

#### d) Bodies responsible

Ministry of Finance and MITECO.

### Measure 1.27. Training of professionals in the renewable energy sector

#### a) Description

Chapter 4 of the NECP, entitled 'Analysis of the impact of the policies and measures of the Plan', estimates a net employment growth of 552.000 jobs in 2030 compared to the baseline scenario.

In 2012, IRENA already reported that achieving renewable energy commitments would require qualified professionals across the value chain, and identified the need to increase and improve training of professionals in renewables as one of the main challenges of the sector. The effects of shortages and poor training of professionals result in a slowdown, economic losses in projects and a worsening of reputation for the technologies concerned.

Both new professionals in the sector and existing professionals, together with professionals from other sectors affected by the just transition, need quality continuous training, enabling them to face the new challenges of future labour markets.

The energy transition process is uniquely linked to the context of the digitalisation of the economy, which makes it more necessary to update training plans to meet the new needs of professionals in the field of STEM education (science, technology, engineering, mathematics) at all levels of education, university degree, master's degree and vocational training, so as to ensure adequate professional qualifications adapted to the labour market demand resulting from the implementation of the NECP.

In the 202 Annual Report on Renewable Energy and Jobs<sup>69</sup>, IRENA points out that for the energy transition to be 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 per capita employment in the sector, as can be seen from a report by the JRC<sup>70</sup>. Spain stands out especially for its contribution to employment in the wind and hydroelectric generation, biofuel production and is a leading leader in heat pump and solar thermoelectric generation technology.

In order to identify new fields of employment and professions, new skills and competences required for professional practice and to develop a proposal for capacity building in line with the needs of the green transition, the Biodiversity Foundation, together with the Spanish Climate Change Office, has published a study on job fields, new knowledge and skills and the creation of technical and professional skills related to climate change mitigation and adaptation and biodiversity conservation, green infrastructure, green connectivity and restoration in Spain. This study identifies 40 strategic occupations, which will need to be created or reoriented in order to move towards the green transition in the next decade.

It should be noted that the Autonomous Communities are responsible for education and training. In addition, a large part of the training currently takes place 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 meet the objectives of the Plan 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 introduction of new decarbonisation technologies, it is necessary to anticipate market demands and promote continuous training at the five levels of accredited professional qualifications, bearing in mind that the European Single Market calls for training in professional skills that facilitate mobility 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, enabling 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 transition, enhancing the re-skilling of workers in those sectors most vulnerable by the energy paradigm shift or reconversion. The Plan foresees new professional profiles related to technologies that are estimated to be a major take-off, but there is hardly any market today, such as new energy storage systems, hydrogen technologies or offshore renewables. New degrees and specialities need to be developed and implemented, at university level and at the middle and higher level of education.
- Attract new talent, facilitating access to new training opportunities. On the one hand, labour market opportunities will be disseminated and, on the other hand, mechanisms (grants, loans, etc.) will be put in place to allow equal access for anyone who wishes to do so. There is a need to publicise the possibilities for a career in the new decarbonised economy. A recent study confirms that the renewable sector represents an opportunity to attract in particular female

---

<sup>69</sup>IRENA and ILO (2022), *Renewable energy and jobs: Annual review 2022*, International Renewable Energy Agency, Abu Dhabi and International Labour Organisation, Geneva

<sup>70</sup>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

female talent<sup>71</sup>.

- Adapting professional profiles to improve technical, health and safety and quality skills, as well as promoting the qualification and certification of installers of the various emerging technologies in line with the different Route Sheets published under the umbrella of the NECP.
- 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 aim of establishing local jobs and taking advantage of the opportunity for renewable energy development.

**c) Mechanisms for action**

- Increase the qualifications of national, local and regional staff responsible for management and processing procedures, as well as project promoters and managers.
- Identification of the professional profiles needed throughout the value chain for the technologies associated with the development of the Plan.
- Matching qualification levels with labour market needs resulting from the implementation of the NECP.
- Awareness raising and outreach to draw the attention of future professionals to the job opportunities offered by the energy transition.
- Training programmes in 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 energisation and empowerment of citizens in general and energy communities, in particular
- Support for the re-skilling of workers in vulnerable sectors or in conversion to the green economy, in order to avoid the human decapitalisation of areas in demographic depression.
- To help address the needs identified in the study published by the Biodiversity Foundation, the Foundation will launch the new Green Jobs + Programme, which will boost the green economy through skills, to improve skills for employment and entrepreneurship.

**d) Bodies responsible**

General State Administration (MITECO, IDAE, ITJ, Ministry of Education and Vocational Training, Ministry of Universities, National Institute of Qualifications (INCUAL), State Public Employment Service (SEPES), MCI), Autonomous Communities, Local Authorities, Energy Agencies, renewable sectoral associations, industry and service sector associations, training companies, trade unions and professional associations.

---

<sup>71</sup>Education and training gaps in the renewable energy sector; LUCAS et al.; Solar Energy 173 (2018) 449 – 455.

### Measure 1.28. Review and simplification of administrative procedures

#### a) Description

The delay in the implementation of the projects means that their promotion is made more expensive. There is a risk of administrative processing, linked to delays or formalities that prolong or create uncertainty in obtaining permits without necessarily bringing improvements or guarantees of an environmental, social or territorial adaptation nature.

Moreover, current administrative procedures are generally not adapted and designed to take account of the deployment of hybrid installations in which different renewable energy generation technologies exist alongside each other, which would value the opportunities for integration into the territory provided by new technologies or organisational models.

In conclusion, **administrative procedures need to be reviewed with the aim of speeding up projects, which in turn are capable of consolidating and strengthening environmental and heritage protection and ensuring adequate public participation.**

To be reviewed:

- The processing of projects for new renewable installations, including the alternative of hybrid projects affecting different renewable technologies, both for the discharge of their generation into the grid and for partial self-consumption and contact points to 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 on land and at sea, 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) Mechanisms for action

- Continuation of the opening of dialogue tables with the Autonomous Communities.  
 Identification of best practices in administrative processes at local, regional and national 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 the territorial reality. This process must have the joint responsibility of all actors in order to ensure the development of equitable renewable potential throughout the territory.
- Update of administrative procedures.  
 Administrative procedures will be adapted to include the processing of hybridisation projects with different renewable technologies. Similarly, the administrative procedure for electricity generation installations in the marine environment from wind and ocean energy will be adapted, with particular attention to reducing processing times for testing platforms and R & D & I projects.  
 In particular, the administrative framework for offshore renewable installations provided for in measures 3.3 (Coordination of the access and connection framework and new electricity grid management models) and 3.4 (Adequacy of the administrative framework for the authorisation of offshore renewable installations) of the 'Roadmap for the development of the Marine Wind and Marine Energy in Spain' of December 2021 will be adapted.
- Integration of renewables in the territory.  
 Compliance with the renewable development objectives set out in this Plan must be compatible with compliance with the regulations on natural heritage and biodiversity. In any case, additional measures such as the creation of sites for the conservation and promotion of indigenous biodiversity will be promoted, with particular regard to species in vulnerable situations.

To this end, a **manual of good practices will be drawn up by the IDAE before the start of the Plan** to mitigate or reduce the environmental and landscape impacts of renewable electricity generation installations that involve the occupation of large areas of land, with precise recommendations on location, construction and integration, with the aim of significantly preserving biodiversity, ecosystem services and the landscape.

This action is further developed in Measure 1.1 of this Plan.

- Procedural guide.

In order to facilitate the implementation of the existing procedures for both developers and the various public bodies involved, IDAE will publish a **guide that unifies in a single document** the different rules applicable to the processing of renewable energy projects, as well as recommendations and best practices. The document will make it possible to avoid procedural errors that require costly corrections in time, as well as to identify potential improvements for the review of the procedures themselves.

- Simplification of the procedures.

The administrative procedure for the granting of authorisations required for the construction and commissioning of production facilities using renewable energy sources and for facilitating the repowering of existing installations will be speeded up, ensuring a simplified and rapid permitting procedure. In this regard, it shall be defined what is meant by a non-substantial modification for the purposes of being exempted from the obligation to obtain prior administrative authorisation and authorisation for construction, pursuant to Article 53 (2) of Law 24/2013 of 26 December, when there are minor changes that do not entail a new energy or environmental impact. This will further simplify the authorisation procedures for production facilities.

In particular, the administrative framework for offshore experimental renewable installations will be simplified, as provided for in measure 1.3 (Marco 'plug 'play' for the replacement of experimental prototypes on offshore renewable energy testing platforms) of the 'Roadmap for the Development of the Marine Wind and Marine Energy in Spain' of December 2021.

- One-stop-shop and simplification of procedures related to demand-side management and integration of renewables

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 throughout the administrative application and permit granting process 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 projects of an experimental nature or for test beds, such as those described in Measure 5.7 of this Plan, so that an envelope or contour conditions that must be met by the project or the various elements tested may be authorised, and which does not require full reprocessing when specific elements of the project are modified within the conditions laid down.

- Establishment of contact points.

Contact points will be designated, which will guide and assist applicants throughout the application and permit granting process without having to contact more than one contact point throughout the process. 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 Autonomous Communities that involve simpler processing.

**d) Bodies responsible**

General State Administration, Autonomous Communities and local authorities.

BORRADOR

**Measure 1.29. Knowledge generation, dissemination and awareness raising**

**a) Description**

One of the challenges facing the Plan is the multi-sectoral approach to its actions, which, combined with the rapid technological evolution associated with decarbonisation, and the dynamic environment for promoting the fight against climate change, ranging from local to multilateral action, makes it essential to implement tools and processes that promote a flow of knowledge and information that is appropriate to all citizens about the decarbonisation process in Spain.

This measure involves deepening the awareness of citizens and the public and private sectors of the need to address the decarbonisation process and disseminate tools, technologies or practices to reduce fossil energy consumption, increase the input of renewable energy, reduce GHG emissions and exploit the potential of carbon sinks.

In this regard, Article 35 of the LCCTE encourages the promotion of the involvement of society by empowering and acquiring responsibility and conducting awareness-raising and awareness-raising campaigns.

**b) Objectives addressed**

Proactive involvement of all actors in the energy transition.

**c) Mechanisms for action**

- **Knowledge generation**

Scientifically validated objective and authoritative qualitative and quantitative data and information are of utmost importance for decision-making as well as for maintaining confidence of both the sector and the general public. In the field of energy transition, MITECO, through IDAE or other institutional instruments, will work with industry stakeholders on identifying and overcoming information gaps and will promote studies and analysis 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 the advancement of decarbonisation, and in particular renewable deployment and savings and efficiency measures, is the persistent lack of knowledge about these processes and points to the launch of good communication practices as a tool to address this issue. The policy mechanisms considered include:

- Activation of awareness-raising campaigns, targeting both the general public and specific social and economic sectors, on decarbonisation, and in particular renewable deployment, as a key tool in the fight against climate change, the associated socio-economic opportunities, as well as the beneficial health effects and quality of life of climate action.
- MITECO, through IDAE, in full cooperation with MITMA and other institutional instruments, will maintain an appropriate dissemination flow on key decarbonisation issues, such as renewable deployment, sustainable mobility and energy savings and efficiency, providing an overview of the need and opportunities for climate action.
- Information and awareness of the climate crisis and the energy crisis will be promoted. In this spirit, the Citizens' Climate Assembly has been set up to establish a social dialogue on the major issues involved in the green transition. It should prepare a report of recommendations and proposals which will be public and serve for discussion at all levels of government and stakeholders in the economy and society.
- More specifically, information will be promoted on the energy classification of household appliances and buildings, on Low-Emission Areas in municipalities, low-emission means of transport, self-consumption systems.
- In this line, the various published Route Sheets (Marine Wind, Self-Consumption, Biogás, Hydrogen and Mineral Raw Materials) include measures on communication and awareness-raising campaigns, improving knowledge with the aim of increasing the participation of social actors in exploring long-term environmental and socio-economic solutions, positioning Spain in holding conferences and forums for sectoral meetings, or designing public-private initiatives to improve society's knowledge.

- **Information campaigns and sectoral training on energy and climate**

Renewable energies, despite their enormous potential for use, are still very unknown in some sectors. There is a need to improve the information available about 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, technology institutes, professional associations or associations of developers of buildings in the tertiary sector. Moreover, communication and information as well as training of professionals in the energy efficiency sector are specifically addressed in Measures 2.19 and 2.20 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 user perception of the benefits of using such technologies. Those programmes had their own image which was linked to a quality control of the partner undertakings which sought to ensure the success of the operations carried out.

In this regard, the Guide to Guidelines for Municipalities on the Promotion of Self-Consumption (IDAE, 2020) has been published.

The various published Route Sheets (Marine Wind, Self-Consumption, Biogás, Hydrogen and Mineral Raw Materials) include measures on the publication of general technical guidance, campaigns to raise awareness of the potential and economic, social and environmental benefits.

- **Access to consumption information**

As stated in Measure 4.8 ‘Access to data’ of this Plan, the possibility for citizens and productive sectors to access their energy consumption data easily and immediately, as well as to transfer this information to third parties, is necessary in order to exploit the potential of energy management, 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 the countries of the European Union shall specify the rules on access to final customer data, including measurement 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 different participants of the measure with increasing quality and speed.

The Energy Storage Strategy published by MITECO includes a measure on boosting public access to data.

- **Promoting the calculation of the carbon footprint and its reduction**

It will be promoted through different channels. One of the main ones is the promotion of the involvement of Spanish organisations in the calculation of carbon footprint, compensation and carbon dioxide removal projects on a voluntary basis created in 2014 by Royal Decree 163/2014 of 14 March (currently being amended to bring 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 the carbon footprint in public procurement, the calculation of the carbon footprint of the ministerial departments and the promotion of the calculation and reduction among Spanish municipalities. Finally, the possibility of promoting the calculation and registration of the carbon footprint for certain subjects will be analysed.

- **Energy Communities as a communication tool for the energy transition**

The first energy communities pilot projects 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 involvement of other members of the community

or other interested actors. Among other tools, such as maps of energy communities in Spain that make it possible to know and approach the reality of these communities, will be put in place.

**d) Bodies 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 fall under Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas 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, as well as by various Royal Decrees implementing it. We are referring mainly to Royal Decrees 18/2019, 317/2019 and 1089/2020. This scheme affects around **900 industrial and electrical generating installations in Spain, as well as more than 30 active aircraft operators**.

Furthermore, 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 emitters and hospitals to be excluded from emissions trading. In addition, in 2019, Royal Decree 317/2019, of 26 April, was adopted, establishing the mitigation measure equivalent to participation in the emissions trading scheme in the period 2021-2025. Currently, 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, which Member States have the option of implementing or not, is that relating to the compensation of indirect costs. They are called indirect costs affecting the 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 mechanism for the compensation of 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 guidelines of the European Commission on State aid in this field (C (2020) 6400 final).

To date, seven calls for aid have been completed, of which only the last one corresponds to costs incurred in the current period, 2021-2030. In the latter, EUR 244 million was allocated to compensate for indirect costs incurred in 2021. The funds available have covered 94 % of the eligible costs in accordance with the Commission guidelines. The 2023 General State Budget foresees the launch of a new call to compensate for the costs incurred in 2022.

For the period 2021-2030, Spain has entered an annual average of around EUR 2.850 billion in the auctions of allowances. The use of this revenue is regulated by Law 7/2021 of 20 May 2003 on climate change and energy transition; more specifically, in Article 30 (4). According to that provision, these resources should be used for the fulfilment of climate change and energy transition objectives. The specific use of revenue must be specified each year in the General State Budget. However, it is expected that EUR 450 billion will be used to finance electricity system costs 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 revenues can be used to offset the indirect cost effects referred to above.

Finally, it is worth noting the reform of the EU Emissions Trading System as part of the Fit for 55 package, which extends this scheme to fossil fuels consumed in the buildings sector, the road transport sector and other additional 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. According to Directive (EU) 2023/959 of the European Parliament and

of the Council of 10 May 2023, this new system will become operational by 2027. This reform includes important developments that will be implemented over the period 2021-2030. These include the extension of this scheme to maritime transport, which will have to start accounting for its emissions from 2024 onwards. In addition, linked to this reform is 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 of imports of certain products (iron and steel, fertilisers, cement, aluminium, electricity and hydrogen).

To 32 % GHG reduction in 2030 compared to 1990 levels, emissions trading sectors contribute with 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 sector, the basic industry and air transport will continue to be regulated through the implementation of the ETS. In addition, an emission trading scheme specific to road transport, buildings and small industry has been established by Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023, with emissions being taxed from 2027 onwards, to which maritime transport will be incorporated, with effect from 2024. In order to mitigate the possible social and distributional impacts that the implementation of this new scheme might 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.

In Spain, the ETS is regulated by Law 1/2005 of 9 March 2007, as well as by various Royal Decrees implementing it. This scheme affects around 900 industrial and electrical generating installations in Spain, as well as more than 30 active aircraft operators. Of these, some 280 industrial installations are covered by the special schemes for small emitters and hospitals. GHG emissions under this scheme (stationary installations) accounted for around 33.5 % of the national total in 2021. Since 2005, when the implementation of the scheme started, emissions have fallen by 37 %.

The latest reforms under the 'Fit for 55' legislative package will have to be transposed into national law by 31 December 2023.

b) **Mechanisms for action**

Law 1/2005 of 9 March 2007 and the Royal Decrees implementing it.

c) **Bodies responsible**

General State Administration and Autonomous Communities.

### 3.1.3. Diffuse sectors

As noted in the Objectives section, this Plan addresses the policies and measures needed to contribute to the European target with a 32 % GHG reduction by 2030 compared to 1990 levels. This reduction effort should be distributed between sectors subject to emissions trading (power generation, refineries and large industries) and sectors that are diffuse or not subject to emissions trading, which in turn can be subdivided into:

- Energy diffusions (residential, commercial and institutional; transport, and industry not subject to emissions trading).
- Non-energy diffusions (agricultural and livestock, waste management and fluorinated gases).

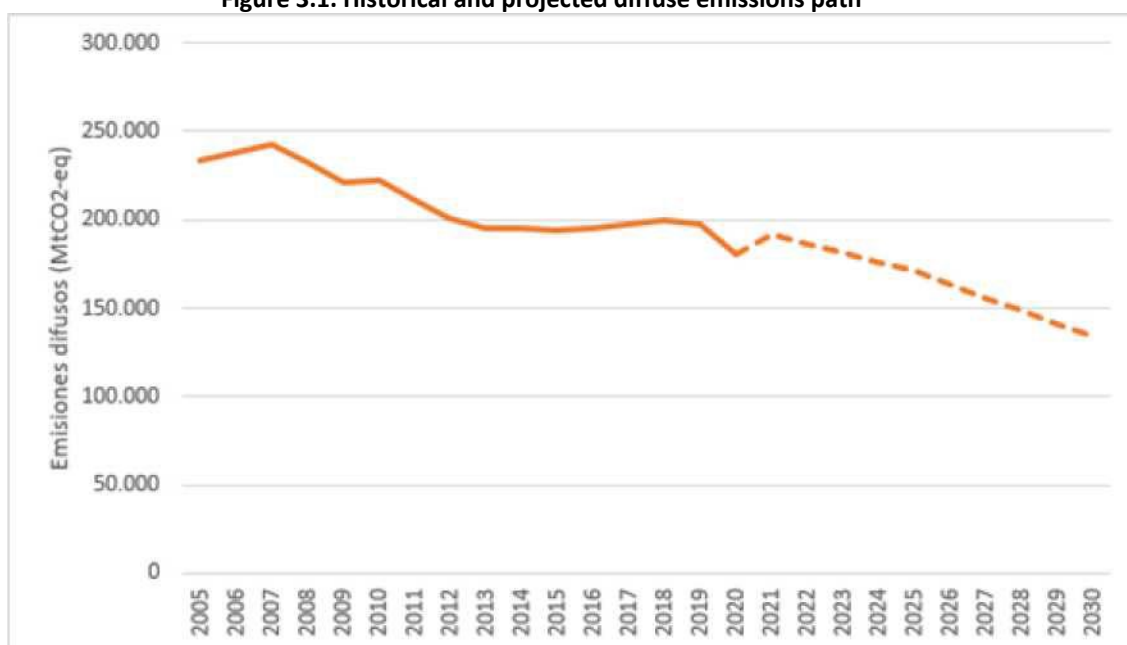
In addition to the calculation of total gross emissions, GHG emissions and removals from land use, land use change and forestry (LULUCF) should be considered.

Regulation (EU) 2023/857 of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and Regulation (EU) 2018/1999 sets binding targets for each Member State to reduce GHG emissions from diffuse sectors for the period 2021 to 2030. According to the Commission, Spain should reduce its GHG emissions in the diffuse sectors by at least 37.7 % by 2030 compared to 2005.

With the measures set out in this Plan, the overall reduction of GHG emissions by 32 % in 2030 compared to 1990, the diffuse sectors as a whole will contribute **to a reduction of around 43 % in 2030 compared to 2005 levels.**

Within this group, the waste management, agriculture and livestock and fluorinated gases (non-energy diffuse) sectors will contribute to a reduction in 2030 compared to their 2005 levels of around **27 %**, **21 %** and **65 %** respectively.

**Figure 3.1. Historical and projected diffuse emissions path**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

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 can issue annually. The reporting cycle of inventory emissions and the amendments made to the Regulation mean that so far only the AEAs for the years 2021 and 2022 are published and the allocations for the years 2023, 2024 and 2025 are close to publication. For the rest of the period it is not yet possible to apply the methodology on inventoried and verified diffuse emissions data.

The specific policies and measures in the **energy sectors** (both diffuse and subject to emissions trading) are described in the sections corresponding to the decarbonisation/renewable and energy efficiency dimensions.

In this regard, it should be noted that, as stated above, transport and **mobility make a decisive contribution to the decarbonisation of the economy envisaged in this Plan.** It is the electricity

sector that makes the greatest mitigation of greenhouse gas emissions, **reducing 32 MtCO<sub>2</sub>eq.** 2019 and 2030. Measures to decarbonise the transport sector are addressed in Chapter 3.1, together with those on improving energy efficiency, addressed in Chapter 3.2, and in particular as regards **modal shift in private cars in urban settings**.

With regard to the identification and establishment of the measures for the **diffuse non-energy sectors** detailed below, these have been analysed using model m3E, which is described in 'Annex B. Models'. They address the decarbonisation of the building sector through the following measure, which extends to the whole life cycle and is complementary to those already covered in Chapter 3.1.1 and those on energy efficiency in 3.2; as well as the agricultural and livestock sectors and waste management, and fluorinated gases.

### Measure 1.31. Building life cycle analysis

#### a) Description

The building sector consumes around 40 % of the European Union's final energy, accounting for 36 % of greenhouse gas emissions from energy sources. In Spain, the sector accounted for 31.6 % of final energy consumption and 9.3 % of total greenhouse gas emissions in 2020. This measure aims to envisage a holistic approach to the decarbonisation of the residential, commercial and institutional building stock through the Life Cycle Assessment (LCA) of buildings. To this end, two types of emissions in buildings are distinguished: operational carbon and depleted carbon.

Operational carbon corresponds to the greenhouse gas emissions associated with the energy consumed during the use of the building in order to keep it in optimal conditions for the performance of its functions or habitability. Includes energy use in heating, cooling, domestic hot water, cooking, lighting and electrical appliances in general. Here it is necessary to distinguish between newly built and existing buildings. Newly built buildings must meet increasingly demanding energy efficiency standards so that, from 2030, Zero Emission Buildings (ZEB) can only be built in accordance with the European Commission's proposal for a revision of the Energy Efficiency in Buildings Directive under the 'Fit for 55' package. For its part, the reduction of emissions during the use phase in buildings already built is developed 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 the main dwellings were built before 1980, thus predating the first legislation that introduced minimum requirements on thermal conditions in buildings. This is why most of the effort to reduce the energy consumption and emissions of buildings should be devoted to existing buildings.

On the other hand, embedded carbon refers to the greenhouse gas emissions associated with the production of materials, construction, use, rehabilitation and end-of-life of the building. This concept makes it possible to integrate all the life-cycle emissions of the building into a single analysis, taking into account not only the emissions due to the energy consumption of the building, but also all emissions related to the activities both prior to the entry into service of the building through construction activities, called initial carbon, and those resulting from maintenance, repair, replacement, renovation and dismantling activities of the building, leading to embodied carbon.

This approach makes it very complex to take into account the emissions of each activity, which must be properly traceable and accounted for. The first step should therefore be to establish an appropriate methodology and register to provide the necessary information to facilitate decision-making towards achieving the decarbonisation of the stock of new and existing buildings. In this regard, Law 7/2021 of 20 May on climate change and energy transition establishes the need to determine the type of companies that must calculate and publish their carbon footprint. This obligation will be regulated through the amendment of Royal Decree 163/2014 of 14 March establishing the carbon footprint register, compensation and carbon dioxide absorption projects, the project of which has already been subject to public information.

#### 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 entire life cycle in order to enable the most effective and efficient decisions to decarbonise the building stock, applying a comprehensive approach

encompassing all possible actions that contribute to achieving the objectives. In doing so, this Plan sets the following priority to first reduce the energy needs of the building and then to cut its emissions through the integration of renewable energy:

1. Reduction of energy needs through the construction of buildings with the lowest carbon footprint or instead renovations of existing buildings, especially the thermal envelope of buildings.
2. Install or replace building equipment with new, more efficient equipment with lower carbon footprint.
3. 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 of buildings must have the lowest possible carbon footprint in order to reduce total emissions over the whole performance or building.’

#### **c) Mechanisms for action**

##### **• Development of the regulatory and regulatory framework**

Analysis of the possibility of setting up a system for calculating the carbon footprint of buildings throughout their entire life cycle, consistent with regulations at European level. This development will be done in a coherent and coordinated manner with the Carbon Footprint Register, Compensation and Carbon Dioxide Absorption Projects.

The aim of this system is to provide an information system to develop a monitoring of the carbon footprint of buildings, and finally, in accordance with European legislation, to set limits on the carbon footprint of buildings, where appropriate. This analysis should place particular emphasis on those activities which may be subject to double regulation because they are subject to the ETS.

Thus, this NECP calls for all the necessary measures to be put in place to give visibility to the total emissions of buildings, so that the sum of carbon depleted and operational carbon accounts those emissions from obtaining 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 short, the decarbonisation of buildings must go hand in hand with the decarbonisation of the rest of the economy.

#### **d) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure will be coordinated by MITECO, responsible for the National Emissions Inventory and the Carbon Footprint Register, Compensation and Absorption of Carbon Dioxide Projects and MITMA as responsible for housing and architecture policy, together with the Autonomous Communities.

## Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors

### a) Description

The actions identified for the agricultural and livestock sectors are described below.

#### A.1. Promotion of crop rotations on arable land

This measure consists of the promotion of rotations on arable land, including improved species, with a percentage of legumes, and replacing monoculture.

Arable crops are often part of the rotations traditionally used to preserve and maintain soil fertility, improve pest, disease and weed control and maintain a certain moisture content in the soil. The introduction of leguminous species into rotations implies an improvement in nitrogen levels in the soil, improving soil structure and fertility, resulting in lower nitrogen fertiliser input from subsequent crops.

Therefore, the cultivation of leguminous crops has a positive effect on climate change mitigation by reducing emissions associated with the use and production of leguminous fertilisers. In addition, from the point of view of adaptation to climate change, it increases soil and crop resilience and is therefore an appropriate adaptation measure, especially in non-irrigated systems.

In any case, it is necessary to comply with GAEC 4 on the creation of buffer strips along rivers and, as far as possible, to maintain or increase the boundary and banks because of their positive contribution to the objective of removals and biodiversity.

#### A.2. Adjustment of nitrogen input to crop needs

The proposed measure consists of drawing up a fertilisation plan that takes into account the needs of the crop, so that organic and inorganic fertilisers are used at appropriate doses and times.

The fertilisation plan shall be drawn up in accordance with the principles of Royal Decree 1051/2022 of 27 December 2007, together with the development of specific fertilisation optimisation plans that allow emissions to be reduced. In addition, the use of manure and slurry will be encouraged in accordance with the aforementioned Royal Decree, which is part of the Circular Economy Strategy, by including them again in the production chain.

The emissions reduced are nitrous oxide (N<sub>2</sub>O) and ammonia (NH<sub>3</sub>) emissions due to inappropriate fertilisation.

#### A.3. Frequent emptying of slurry in pig housing

The measure consists of the frequent emptying of pits below confinement sites in pig facilities. Depopulation is considered to be frequent if it is carried out at least once a month. The reference technique is the emptying of the pits at the end of the phase or when they are full. This frequent emptying reduces NH<sub>3</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions.

These improvements in the handling of slurry and manure in housing for the different categories of pigs and cattle lead to a reduction in emissions inside the housing.

#### A.4. Covering of slurry ponds

This measure consists of covering slurry ponds in the new pig and cattle installations, in accordance with at least the conditions laid down in the corresponding and respective Royal Decrees governing the two sectors and with monitoring of these measures to allow for the quantification of emission reductions and the design of additional measures and incentives.

It shall be considered that the amount of methane generated by a specific manure management system is affected by the extent to which anaerobic conditions, system temperature and retention time of the organic material in the system are present.

The total covering of slurry ponds reduces NH<sub>3</sub> and odour emissions by more than 90 %.

#### A.5. Solid/liquid slurry separation

The proposed measure consists of solid/liquid separation of slurry with subsequent storage of solids and emptying of the liquid fraction in uncovered anaerobic lagoons in high livestock concentration areas (pigs and cattle). This liquid fraction shall be used for irrigation, taking advantage of its fertilising value.



Solid/liquid separation, as well as allowing better manure management, facilitates subsequent treatments and reduces GHG emissions.

The storage of the solid fraction has a lower methane conversion factor (MCF) than for liquid manure storage, 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 the solid fraction of slurry**

The proposed measure is the production of organic fertiliser (compost) from pig and cattle effluents in areas of high livestock concentration.

In composting, the action of aerobic bacteria oxidises ammoniacal nitrogen, thus reducing NH<sub>3</sub> emissions. In addition, this process allows for the stabilisation of residues by aerobic fermentation generating CO<sub>2</sub> (which is not taken into account in the final balance as it comes from biomass) and small quantities of CH<sub>4</sub> and N<sub>2</sub>O compared to other techniques that generate more GHGs.

The compost produced is an organic soil improver that improves soil fertility and soil characteristics, as it helps to fix the carbon in the soil.

Measures will also be taken to reduce the burning of stubble in order to reduce the harmful health effects of particulate matter emissions.

#### **b) Mechanisms for action**

MAPA regulatory measures or interventions in the Common Agricultural Policy Strategic Plan (CAP).

#### **c) Bodies responsible**

Map, together with the Autonomous Communities in accordance with the distribution of powers in Spain.

### 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, largely due to the adoption of the following regulatory and planning instruments:

- Law 7/2022 of 8 April 2003 on waste and contaminated soil for a circular economy<sup>72</sup>, which transposes into national law two Community legislation on waste: 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. In addition, it reviews and updates the legal framework applicable to the production and management of waste in Spain.
- Royal Decree 646/2020, of 7 July, regulating the disposal of waste by landfilling. This legislation emphasises and reinforces the pre-treatment of waste, particularly municipal waste, with a consequent reduction in the quantities of GHG emitted from landfill facilities. On the other hand, the explicit inclusion of GHG emission costs in waste disposal costs has been introduced as a novelty, giving a finalistic nature 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.
- The Spanish Circular Economy Strategy Spain 2030<sup>73</sup>, 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 2030, including a 30 % reduction in national material consumption in relation to GDP compared to 2010, a reduction in waste generation by 15 % compared to 2010, a reduction in food waste generation throughout the food chain, an increase in reuse and preparation for re-use to 10 % of municipal waste generated, a 10 % improvement in water efficiency and a reduction in greenhouse gas emissions from the waste sector to below 10 MtCO<sub>2</sub>eq. To this end, six priority sectors for action are identified (construction, industry, consumer goods, agri-food, tourism and textiles).

The strategy is developed through successive **three-year action plans**, the first of which is the corresponding 2021-2022 period<sup>74</sup>. The plan contains 116 measures drawn up by eleven ministries with the aim of forming a coordinated and complementary response which strengthens each of the individual measures proposed to achieve the objectives defined for 2030 and which in turn remains consistent with the initiatives and policies undertaken at Community level. It is structured into several Priority Axes: Production, Consumption, 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.

These new rules are accompanied by other sectoral regulations for specific waste streams, which have been adopted in recent months, are intended to improve the management of certain waste streams and will undoubtedly also lead to a reduction in GHG emissions. One example of this is 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 2009 amending Royal Decree 1619/2005 of 30 December 2007 on the management of end-of-life tyres; Royal Decree 27/2021 of 19 January 2009 amending Royal Decree

<sup>72</sup>[BOE.es – BOE-A-2022-5809 Law 7/2022 of 8 April on waste and contaminated soil for a circular economy.](https://www.boe.es/boe/A-2022-5809)

<sup>73</sup>[https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/Plan actu eco circular def nipo tcm30-509532 mod tcm30-509532.pdf](https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/Plan%20Actu%20Eco%20Circular%20Def%20Nipo%20TCM30-529618.pdf)

<sup>74</sup><https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/plan actu eco circular def nipo tcm30-529618.pdf>

106/2008 of 1 February 2007 on batteries and accumulators and the environmental management of waste batteries and accumulators and Royal Decree 110/2015 of 20 February 2002 on waste electrical and electronic equipment; and Royal Decree 265/2021 of 13 April 2007 on end-of-life vehicles and amending the General Vehicle Regulation. This circular economy regulatory package will be complemented by the upcoming adoption by the Council of Ministers in 2022 of regulatory measures on packaging and packaging waste.

Another element that is contributing to significantly accelerating progress in the implementation of the waste policy and the implementation of the integrated National Energy and Climate Plan 2021-2030 is the PRTR, presented in June 2021. The PRTR includes Component 12 'Industrial Policy of Spain 2030', the purpose of which is to lay the foundations for a more modern and competitive industry that definitively incorporates the climate and environmental vector, among the measures included in this component, in the field of the circular economy and waste, should be highlighted:

- Reform C12.R2 "Waste policy and boosting 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 help promote 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.

In addition, as part of the forecasts for this component, mainly of its investment, the PERTE in Circular Economy was presented in March 2022, which will give a definitive boost to the incorporation of the 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 renewable energy equipment.
- Line of Action 2: Cross-cutting action to boost the circular economy in business

Below are the actions identified for the waste sector which, taken as a whole, constitute a measure included in the WEM scenarios or baseline scenario and WAM scenario or target scenario of this first revision of the 2021-2030 NECP. For the implementation of these measures, investment C12.I3 from the Spanish PRTR has been designed, as mentioned above, allocating most of it (around EUR 600 million) to the implementation of measures to improve the management of municipal waste, in particular bio-waste.

#### **A.1. Home or community composting**

This refers to the separation at source of bio-waste, or the organic fraction of municipal solid waste (OFMSW), for *on-site* recycling by means of home or community composting. The measure targets families, schools, or owners' associations, 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-raising/training campaign in the households and communities involved to ensure the success of the measure. As a result, bio-waste is not sent to the landfill site, the frequency of collection of the remaining fraction is reduced and compost of good quality 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 contaminated soil for a circular economy, Article 25 of which lays down the mandatory separate collection of bio-waste from households before 30 June 2022 for local authorities with a population of more than 5 000 inhabitants, and before 31 December 2023 for the rest.

Article 28 of the Law also requires local authorities, in particular those with a population of less than 1.000 inhabitants, to adopt the necessary measures for the separation and recycling at source of bio-waste through domestic and community composting, or separate collection and subsequent transport and treatment in specific recycling facilities, primarily for composting and anaerobic digestion or a combination of the two. Similarly, Article 26 of the Law sets out the minimum targets for preparing for re-use and recycling of municipal waste to be achieved by 2025, 2030 and 2035, respectively: 55 %, 60 %

and 65 %.

### **A.3. Separate collection of bio-waste 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 primarily urban, as it is estimated that the plants will have over 40.000 t of capacity.

Mitigation in this case involves two aspects, one of which is similar to the previous ones, as it reduces the frequency of collection and prevents bio-waste from going to landfill, and the other is the savings generated by the use of renewable energy.

As in action a.2. Law 7/2022 lays down the terms of reference on the deadlines for the implementation of separate collection, the objectives to be achieved and the involvement of local authorities.

### **A.4. Food waste reduction**

This measure forms part of the actions to prevent waste generation. At international level, it is covered by the Sustainable Development Goals. SDG 12.3 proposes to reduce food waste by half in the various stages of consumption, and to limit losses and waste in primary production, processing and distribution.

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 annually quantifies the amount of food landfilled through the Household Food Waste Measurement Panel, 1,2465 million tonnes in 2021. After the expiry of the National Strategy "More Food, Less Waste" in 2020, the next step in addressing the problem of food waste has been 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 origin in the harvest process itself to consumption habits in households and catering. Among other measures, it establishes that all actors in the food chain must have a prevention plan in place to prevent waste, and establishes a hierarchy of binding priorities, the first of which is use for human food, through donations to non-profit companies or food banks. The draft law was approved by the Council of Ministers on 7 June 2022 and is currently being processed by parliament.

Furthermore, Article 18 of Law 7/2022 of 8 April on waste and contaminated soil for a circular economy incorporates the objective of a 50 % reduction in per capita food waste 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, which will contain the general guidelines to be taken into account by the various operators involved and the actions and lines of work to be carried out by the various public administrations within the framework of their responsibilities.

### **A.5. Increased separate collection of paper in the municipal channel**

This measure consists of increasing the collection and recycling of paper in the municipal waste stream (households, small businesses, HORECA [hotels, restaurants and cafés], buildings, banks and offices). Paper, although in generic 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 increased potential for separate collection and recycling and has a methane emitter potential 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 2003 on waste and contaminated soil for a circular economy expressly includes the role as one of the waste fractions for which local authorities must establish separate collection.

### **A.6. Increase in separate collection of used domestic cooking oil**

Used cooking oils are valuable as a secondary material for the manufacture of biodiesel or other biofuels. Thus, this measure not only contributes to the reduction of emissions from inadequate management, but also brings other benefits such as contributing to renewable energy and advanced biofuels targets and reducing the risk of water and aquifer pollution.

The measure focuses on the separate collection of domestic cooking oil, as it is already sufficiently

established in the hotel and catering industry. The local councils would be in charge of implementing a collection model that is suitable for their municipality.

#### **A.7. Increased separate collection of textiles**

Textiles represent 6 % of the residual waste that is landfilled in Spain, and natural fibres account for half of that amount. Although part of this waste stream is already collected separately 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 locally responsible textile waste by 31 December 2024.

The measure consists of the separate collection of used clothes and textiles by means of street containers or other facilities for reuse and recycling, avoiding landfilling, where natural fibres emit methane as a result of decomposition. In many cases, the implementation of these measures can also be linked to other social benefits.

#### **A.8. Management of biogas escaped in sealed landfills**

For many years, waste management in Spain involved the landfilling of waste, which has resulted in a large number of landfills that have been sealed in accordance with regulations, but in which there is still a substantial amount of biogas leakage. 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 involves applying an oxidising cover soil to the surface of the landfills in question, estimating a conservative rate of surface oxidation based on studies and projects on the topic.

#### **A.9. Use of pruning remains from woody crops as biomass**

This measure consists of using pruning waste as biomass in the form of pellets or chips for use in heat or cogeneration in both the residential and industrial sectors, replacing fossil fuels.

Olive groves and vineyards are essentially considered to be the largest area under cultivation and pruning, in size and volume, which it causes.

In addition, extension to other crop remains will be studied taking into account their different uses, whether food uses, soil organic carbon enhancement or biomass use.

This measure also entails a significant reduction in particulate matter, thus contributing to the National Air Pollution Control Programme.

Spain's CAP Strategic Plan (CAP) includes through Pillar II interventions, financed by the EAFRD, intervention "6842.1 – Aid for investments with environmental objectives in the processing, marketing or development of agricultural products", which co-finances investments aimed at reducing GHG emissions, including in the processing of agricultural biomass for energy production. In addition to the supranational intervention, a total of seven Autonomous Communities have scheduled this intervention to be carried out in their territory.

#### **b) Mechanisms for action**

The main mechanisms are regulatory and planning instruments that have been discussed in the description of the measure:

- Law 7/2022 of 8 April on waste and contaminated soil for a circular economy, Article 25 of which provides for the separate collection of bio-waste from households before 30 June 2022 for local authorities with a population of more than 5 000 inhabitants, and before 31 December 2023 for the rest. The law also introduces landfill and incineration taxes, among others that will help minimise this type of management options.
- Royal Decree 646/2020 of 7 July regulating the disposal of waste by landfilling which transposes the restriction on the 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. 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 digestate in order to be considered as fertiliser.

- Draft Law on the Prevention of Food Losses and Waste, which aims to establish a model of good practices to prevent food waste through action throughout the food chain, from origin in the harvesting process itself to consumption habits in households and catering. Among other measures, it establishes that all actors in the food chain must have a prevention plan in place to prevent waste, and establishes a hierarchy of binding priorities, the first of which is use for human food, through donations to non-profit companies or food banks.
- Order TED/426/2020, of 8 May, establishing the criteria for determining when recovered paper and paperboard intended for the production of paper and paperboard ceases to be waste in accordance with Law 22/2011 of 28 July 2003 on waste and contaminated soil.
- Other ministerial orders terminating the status of waste or declarations of by-products which are considered applicable.

The financial instruments contributing to the implementation of the measures are:

- Component 12 “Industrial Policy of Spain 2030” of the PRTR.
  - Reform C12. R2 “Waste policy and boosting the circular economy” in the context of which the Circular Economy PERTE has been developed.
  - Investment C12.I3 ‘Plan to support the implementation of waste legislation and the promotion of the circular economy’
- Aid for waste via Environmental Promotion Plans (PIMA) and State Waste Management Framework Plan (PEMAR).
- Other MAPA regulatory measures or CAP Strategic Plan interventions.

#### **c) Bodies responsible**

Map and MITECO jointly with the Autonomous Communities and Local Authorities in accordance with the distribution of competences in Spain. By virtue 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 adopting the rules and at the implementation stage. These include the CCPC, the CAMA, the sectoral conference, etc. Also for the specific area of waste, there is also a Waste Coordination Committee, regulated in Article 13 of Law 7/2022, in order to ensure coordination and cooperation between the different administrations.

### Measure 1.34. Reduction of GHG emissions related to fluorinated gases

#### a) Description

##### A.1. Replacement of installations using fluorinated gases with high warming potential (GWP) with other installations using low or zero GWP

It consists of replacing equipment using HFC with high warming potential (mainly cooling/air conditioning equipment) with alternative equipment using either zero or low warming potential refrigerant gases (CO<sub>2</sub>, NH<sub>3</sub>, hydrocarbons or fluorinated gases with low warming potential such as R32 or HFO). It is a measure that acts on the total existing HFCs bank.

##### A.2. Reduction of HFCs emissions through actions in existing installations using HFCs

It consists of reducing emissions from existing installations through measures that reduce the emissions of HFCs associated with leaks of this equipment. The measures include the implementation of regular checks, automatic leak control systems, *retrofit*, reconversion of existing high-warming potential F-gas facilities to other low-GWP F-gases compatible with the installation, as well as closure of refrigeration furniture in 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 the life of the equipment using them, prioritising regeneration and recycling over other management options. Recovering the refrigerant gas and managing it in an appropriate manner prevents the entire load from being emitted into the atmosphere.

##### A.4. Promotion of the use of low-heating potential lightly flammable refrigerants

It consists of a revision of the safety standards for cooling and air conditioning, which will make it possible to make greater use of slightly flammable low-GWP A2L refrigerants (such as R32 and HFO), especially in the domestic air conditioning sector. The universe of the measure consists of sales of domestic air-conditioned equipment in Spain.

#### b) Mechanisms for action

- **Tax on fluorinated greenhouse gases** ( Law 16/2013 of 29 October 2007 establishing certain measures in the field of environmental taxation and adopting other fiscal and financial measures).
- **Gradual reduction by quota system under** Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 and future Regulation replacing them.
- **Royal Decree 115/2017, of 17 February, regulating the placing on the market and handling of fluorinated gases** and equipment based on them, as well as the certification of the professionals using them and establishing the technical requirements for installations carrying out activities that emit fluorinated gases.
- **Voluntary agreement** for a comprehensive management of the use of SF<sub>6</sub> in the most environmentally friendly electricity industry.
- Amendment of Royal Decree 138/2011 of 4 February 2007 approving the **safety regulation for refrigeration installations and its additional technical instructions**.

#### c) Bodies responsible

MITECO and MINCOTUR.

### 3.1.4. Land use, land use change and forestry (Regulation 2018/841)

The amendment of Regulation 2018/841 as part of the 'Fit for 55' package, through Regulation 2023/839, provides for a fundamental reform of the targets affecting the land use, land use change and forestry (LULUCF) sector and its accounting towards 2030 targets. The main novelty of the amendment is the establishment of a new target to maintain the current level of sink in the EU (-268 Mt CO<sub>2</sub>eq) and its increase by approximately 15 % (-42 Mt CO<sub>2</sub>eq), to achieve total

removals in the EU of -310 Mt CO<sub>2</sub>eq in 2030.

To this end, new binding national targets are established from 2026 onwards, when the accounting will match the LULUCF report in the GHG inventory, and therefore no longer apply the previously established accounting rules and the 'no-debit rule', which should ensure that emissions do not exceed 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.

The new framework therefore sets out two sub-periods, 2021-2025 and 2026-2030, with heterogeneous objectives and rules. In the first subperiod, the original accounting and target rules of Regulation (EC) No 2018/841 are maintained, while the second sub-period sets a target of -43,6 MtCO<sub>2</sub>eq for Spain, which will be accounted for in accordance with the GHG inventory.

In this context, forecasts for the LULUCF sector in Spain continue to point to saturation in the absorption capacity of CO<sub>2</sub> by natural sinks, attributable to a number of different causes, including impacts resulting from climate change in the Spanish agroforestry sector (increase in temperature and reduced water availability, in particular) and its capacity to absorb CO<sub>2</sub>, or the widespread increase in the risk of desertification throughout 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 climatic conditions, these measures require time to enhance the removals generated, while contributing to the maintenance of the social, ecological and economic functions of terrestrial ecosystems. It is therefore important to consider the long-term effect of these measures, especially in the context of the 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 MtCO<sub>2</sub>eq compared to the trend scenario (0,78 MtCO<sub>2</sub>eq in forest sinks and 0,18 MtCO<sub>2</sub>eq in agricultural sinks), although, as noted and for reasons of biomass growth dynamics and other carbon deposits, the effect of these measures was more effective the longer the time considered.

However, these efforts would not be sufficient to meet the new targets set for the period 2026-2030, which should result in an additional increase of at least -5,3 MtCO<sub>2</sub>eq 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 for the LULUCF sector and thus for Spain's forestry and agricultural policy.

The lines of work 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 of application in sub-measures 1.35 and 1.36, on the development of new or planned planning instruments, including the Nature Restoration Plan (which derives from the Nature Restoration Law proposed by the EU and currently under negotiation), the new Spanish forest policy framework (including the revision of the Spanish Forest Strategy and the Spanish Forestry Plan) 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 surface areas, both in physical and legal terms. It is also important to mention the high uncertainty inherent in the LULUCF sector and its performance.



As a result of the measures included in this Plan, compliance with the ‘non-debit rule’ established in the period 2021-2025, which maintains the accounting rules of the original Regulation 2018/841, is expected, with a surplus of approximately -10,2 MtCO<sub>2</sub>eq, as can be seen in the following table.

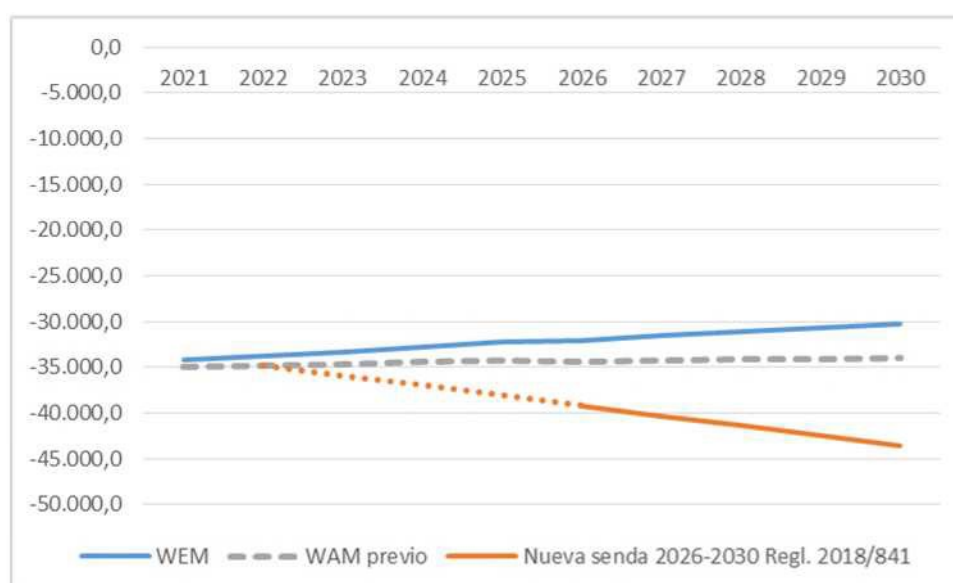
**Table 3.2. Projection of LULUCF accounting under Regulation (EU) 2018/841 of cumulative CO<sub>2</sub>eq emissions/removals over the period 2021-2025**

Accounting category	WAM estimate		Accounts 2021-2025 (ktCO <sub>2</sub> eq)
	2021-2025 (ktCO <sub>2</sub> eq)	Accounting principle 2021-2025	
<b>Deforested land</b>	2.432	KP2 <i>gross-net</i>	2.432
<b>Afforested land</b>	- 17.189	KP2 <i>gross-net</i>	- 17.189
<b>Managed forest land</b>	- 150.806	FRL (-164.165 ktCO <sub>2</sub> eq)	13.359
<b>Farmland managed</b>	- 8.796	<i>Net-net</i> average 2005-2009 (7.755 ktCO <sub>2</sub> eq)	- 16.551
<b>Managed grassland</b>	1.238	<i>Net-net</i> average 2005-2009 (-6.515 ktCO <sub>2</sub> eq)	7.753
<b>Managed wetland</b>	NA	<i>Net-net</i> average 2005-2009 (270 ktCO <sub>2</sub> eq)	NA
<b>TOTAL</b>			<b>- 10.195</b>

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

For its part, and in application of Regulation 2018/841, as amended, in the period 2026-2030, a trajectory will be established in 2024, starting from the average results in the LULUCF chapter of the 2021, 2022 and 2023 inventories for 2022, and the end point for the aforementioned target of -43,6 MtCO<sub>2</sub>eq in 2030. This trajectory will generate a carbon budget (defined by the sum of the results established by this path in each of the 5 years from 2026 to 2030), the achievement of which is another objective set by the amendment of Regulation 2018/841. On the basis of currently available data, the deficit on this cumulative budget would be around 30MtCO<sub>2</sub>eq for the whole period 2026-2030, in the absence of additional measures.

**Figure 3.2. Projection of LULUCF accounting under Regulation (EU) 2018/841 of the cumulative CO<sub>2</sub>eq emissions/removals in the period 2026-2030**



*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

Lastly, it should be pointed out that the amendment to Regulation (EC) No 2018/841 proposes an improvement in the methodologies used in the GHG inventory in all reservoirs and LULUCF categories, on which work has already started in Spain and is expected to lead to an improvement in the estimates of deposition identified as relevant, as is the case with COS on agricultural soils or dead wood on forest land.

### Measure 1.35. Forest sinks

#### a) Description

The actions identified for forest sinks are described below.

##### A.1. Regeneration of dehested systems

The main problem at present in the conservation of dehesas is the absence of regeneration of the dominant woodland. This is due to various causes such as overgrazing, lack of planning for silvopastoral management, excessive use of wood, excessive hunting burden, forest fires or the incidence, in recent years, of radical rot and other factors that lead to declines that are colloquially classified as dry. These factors have led to an unfavourable conservation status in the Spanish dehesas and other dehesado systems, with inadequate tree densities.

The aim of this measure is to regenerate dehesas and other open woodlands so that they are considered silvopastoral systems and fully account for the sink effect, with the dual aim of perpetuating these ecosystems, one of Spain's main natural assets from a social, economic and environmental point of view, and to avoid costs and losses of CO<sub>2</sub>, both in tree biomass and in the soil.

##### A.2. Promotion of shafts and native species to replace agricultural crops in flood-prone areas

This measure aims to promote sometimes the rationalised cultivation of pots, taking into account their importance for the national economy and their environmental contribution in terms of the absorption of CO<sub>2</sub> together with their potential for stabilising banks and compatibility with floods and regular ponds. The latter makes it a suitable 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 a transitional land between agricultural land and river banks.

At the same time, this measure aims to boost the forest sink effect through the preferential development of native and structurally complex formations and species, avoiding as far as possible orientation towards monocultures. In addition, for the restoration of riverside vegetation and the stabilisation 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 and riparian vegetation indicators. In other words, the restoration of indigenous riparian ecosystems will be pursued wherever possible.

For this measure, structurally complex native species (and sometimes new shafts) will be introduced in flooded areas with a return period of 10 years, according to the flood risk map from river to economic activity (SNCZI).

##### A.3. Creation of woodland afforested

Forests play a central role in the global carbon cycle, capturing it from the atmosphere as they 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 (biodiversity, protection of the hydrological cycle, employment, products, etc.).

This measure covers the promotion of afforestation activities (conversion, by direct human activity, of land that did not have forest, for a period of at least 50 years, into forest land by planting, sowing or anthropogenic promotion of natural regeneration) and reforestation (conversion by direct human activity of non-wooded land into forest by planting, seeding or anthropogenic promotion of natural regeneration, on land that was afforested but is currently deforested).

##### A.4. Carrying out forestry work to prevent forest fires

We are currently faced with a forest environment highly prone to fires, in which the means of extinction are reaching limits of effectiveness. It is therefore essential to increase the focus on preventive work that contributes to reducing risks and facilitating extinction tasks.

This measure considers the work needed to reduce and control forest fuels, making forests more resistant at 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 associated with forest fires, in addition to the carbon loss fixed in biomass and the generation of additional gas emissions (CH<sub>4</sub>, N<sub>2</sub>O, NO<sub>x</sub> and CO) from incomplete combustion, such as loss of soil organic carbon and consequent erosion, or public spending on extinction.

The working method is based on the application of techniques by specialised staff, proposing and implementing specific 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 proposes the integration of planned grazing activities into fire prevention, as an additional complementary tool.

Controlled grazing in pasture-firewall areas is a sustainable agricultural practice, in which livestock work together to reduce fire risks and plays an important ecological role in the Mediterranean mountains. In addition, incorporating it into all the tools used to manage woodland stimulates monitoring and the interest of the local population in maintaining it, encouraging coordinated work between technicians and livestock farmers, which strengthens the social prevention of fires.

Grazing in firewall areas is therefore a useful tool for fire prevention, while at the same time offering very positive environmental and social externalities, making it ultimately a valuable land management system.

#### **A.6. Promotion of sustainable forest management in conifers, application of a clear scheme to increase the carbon absorbed**

In addition to the increase in forest area through planting and land use changes, it is possible to increase the biomass accumulation capacity of already established forest systems by implementing different management proposals.

The clear-cut, understood as a reduction in the density of individuals of the same species, are the crucial intermediate forestry intervention in the management of forest systems. Its objectives include reducing competition, improving the individual vigour of trees, regulating the specific composition, anticipating and maximising production at the end of the shift, and increasing the value and size of products.

From the point of view of the fixing of CO<sub>2</sub>, there is ample scientific evidence that, although the clear reduction in woodland in the forest, the application of certain schemes may increase the total amount of CO<sub>2</sub> absorbed by the forest throughout the production cycle.

This measure encourages the establishment of management plans to ensure that an appropriate clear plan is implemented, quantifying the improvement it would entail in terms of the absorption of CO<sub>2</sub>, without quantifying other associated benefits (improvement of forest health, reduction of forest fires, etc.).

#### **A.7. Hydro-forestry restoration in areas at high risk of erosion**

Hydro-forestry restoration comprises all the measures necessary to preserve, protect and restore the stability and fertility of soils, to regulate run-off, to consolidate watercourses and slopes, to contain sediment and, in general, to protect the soil against erosion, actions that manage to retain soil organic carbon, as well as other synergistic effects such as protecting against desertification, droughts and floods, preserving and restoring biodiversity and enriching the landscape.

The measure consists of the establishment of structures for the correction and stabilisation of channels in areas at high risk of erosion (according to the **national action plan against desertification** risk map), without considering the afforestation of these land as these actions are considered as a separate measure.

#### **b) Mechanisms for action**

- Possible interventions to be developed under the future CAP Strategic Plan in Spain.
- Inclusion, where appropriate, of some interventions in the third generation river basin

management plans and flood risk management plans.

- Harmonisation of fees for the use of public water resources in order to encourage the planting of shafts in authorised areas.
- Promotion of public-private financing instruments aimed at promoting the creation of territorial contracts that develop forest fire prevention measures.
- Analysis and study of forestry 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 that develop measures to facilitate grazing on forest land.
- Promotion of intermediate forestry treatments to improve the production of higher added value forest products and the energy use of forest waste.
- Development and implementation of the **Plan of Priority Actions for Forest Hydrological Restoration**.
- Development and implementation of the Spanish Forestry Plan

- 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’.**

**c) Bodies responsible**

Map and MITECO, together with the Autonomous Communities, in accordance with the distribution of powers in Spain.

BORRADOR

### Measure 1.36. Agricultural sinks

**a) Description**

The actions identified for agricultural sinks, which together form an additional measure for the WAM scenario or target scenario of the 2021 NECP2030, are described below. They are also relevant because of the synergies they present in order to better adapt the agricultural sector to the impacts of climate change and are therefore aligned with the PNACC.

**A.1. Promotion of conservation agriculture (direct sowing)**

This measure consists of the application of conservation techniques, resulting in an increase in removals of CO<sub>2</sub> by agricultural land and a reduction in emissions from the use of diesel by agricultural machinery. The measure is appropriate both in terms of mitigation and adaptation to climate change, as it favours soil

as a carbon sink and also improves its resilience. Implementation requires training of farmers.

#### **A.2. Maintenance of plant cover and incorporation of pruning remains into the ground in woody crops**

This measure provides for the maintenance of live plant cover between the crop streets and the addition of pruning remains from woody crops to the soil. These two agronomic practices are compatible and synergistic.

The reduction of wintering gases is achieved, on the one hand, by disregarding traditional tillage of the soil and, on the other hand, by preventing the uncontrolled burning of pruning remains. In addition to reducing emissions, there are agronomic (improved 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) benefits.

#### **b) Mechanisms for action**

- MAPA regulatory measures or interventions in the CAP Strategic Plan.
- PRTR, Component 3, Investment 4, C3.I4: “Plan to promote sustainability and competitiveness of agriculture (III): Investments in precision agriculture, energy efficiency and the circular economy in the agricultural and livestock sector”.

#### **c) Bodies responsible**

Map jointly with the Autonomous Communities, in accordance with the distribution of powers in Spain.

### 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 sets out the need to ‘adapt the tax system to the 21st century economy’ and ‘new green taxation – alignment of taxation with environmental impact’, the Ministry of Finance will lead the in-depth study and, where appropriate, the corresponding deployment of the updating of those elements of the tax system that systematically incentivise a low-carbon and climate-resilient economy, through the progressive and widespread internalisation of the environmental externalities that take place in the generation and use of energy, as well as in the performance of the main economic activities that generate greenhouse gas emissions and increase the vulnerability of the Spanish economy to foreseeable impacts of climate change.

In addition, the Climate Change and Energy Transition Law 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 this integrated National Energy and Climate Plan. In particular, the Law provides as follows:

- The application of **new tax advantages to energy products of fossil origin** shall, as a general rule, be duly justified on grounds of social, economic interest or in the absence of technological alternatives.

The Ministry of Finance shall annually draw up a report on the tax regime applicable to energy products of fossil origin and, on the basis thereof, MITECO shall draw up a proposal for a timetable for reviewing aid and measures to promote the use of this type of energy product.

- With regard to **public resources earmarked 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 objectives set for climate change and the energy transition.
  - The revenues from the auctioning of greenhouse gas emission allowances shall be used to finance the electricity system costs provided for in the Electricity Law, which relate to the promotion of renewable energy; to mitigate situations caused by the transition to a decarbonised economy or linked to vulnerability to the impacts of climate change; and the offsetting of the effects of indirect costs due to CO<sub>2</sub> emissions, linked to electricity consumption, for installations at risk of carbon leakage.
- It amends Law 15/2012 of 27 December 2003 on fiscal measures for energy sustainability, so that each year’s General State Budget Laws will allocate an amount to finance the costs of the electricity system provided for in the Electricity Sector Law, which relate to the promotion of renewable energy.

As set out in the Climate Change and Energy Transition Law, the government has set up a group of experts to assess a tax reform that will value green taxation. In any case, the changes made in this area will be in line with the economic situation.

## 3.2. DIMENSION ENERGY EFFICIENCY

### 3.2.1. Measures for the fulfilment of the energy savings obligation. Sectoral approach

The Energy Efficiency Directive (EU) 2018/2002, currently under revision, provides in Article 7<sup>75</sup> for the obligation to demonstrate cumulative final energy savings over periods. This plan takes into account savings accumulated from 1 January 2021 to 31 December 2030, following the same cumulative scheme applied in the first period of application of the Directive, from 1 January 2014 to 31 December 2020.

In compliance with this obligation, and resulting from the ambition included in Directive (EU) 2018/2002, Spain notified the European Commission of 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 figures 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 of the period was initially 676 ktoe. This figure is substantially higher than the cumulative savings target for the previous period, i.e. 2014-2020, and amounted to 15.979 ktoe.

However, this objective has fallen behind the agreement reached between the Parliament, the Council and the Commission on the new text of the Energy Efficiency Directive. Thus, this Plan established a new **cumulative target value for final energy savings of 1.49 % on average, corresponding to a cumulative 53.593 ktoe, based on** a phased increase in the intensity of the target, in accordance with the provisions of the Directive:

- 1.3 % for 2024-2025, up to 1.099 ktoe;
- 1.5 % for 2026-2027, corresponding to an increase to 1.268 ktoe;
- 1.9 % for 2028-2030, with additional annual savings up to 1.607 ktoe.

It should be pointed out that, although this objective is not yet in force as the new Directive has yet to be finally adopted and transposed into the Spanish regulatory framework, this document sets out the savings path and the set of measures to be put in place to achieve it.

The cumulative savings targets shall be achieved by means of a set of complementary measures, including those promoted by the Recovery, Transformation and Resilience Plan, the National Energy Efficiency 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 persons, or alternatively, the Energy Saving Certificates; as well as the application of alternative regulatory, fiscal, economic or information and communication measures.

The energy efficiency obligation system is regulated in Spain by Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency. This law also created the **EENF**, without legal personality, as an instrument for the implementation of economic and financial support mechanisms, technical assistance, training and information or other measures aimed at increasing energy efficiency in all sectors. Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and in 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 amending the

---

<sup>75</sup>In the new proposal for an Energy Efficiency Directive savings are included in Article 8.



### Energy Efficiency Directive.

In addition, Royal Decree 36/2023 of 24 January 2007 establishing a **system of energy savings certificates creates** 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 energy traders to meet their savings obligations, benefit consumers and boost employment, productivity and business competitiveness. In addition, it complies with one of the measures provided for in the More Energy Security Plan. The tool will allow companies subject to an annual share of energy savings to voluntarily replace a percentage of their EENF payments with certified energy savings stemming from energy efficiency investments. This system is described in detail in Measure 2.23.

In addition to the mechanisms that may be articulated within the SNOEE with the resources of the FNEE and with the implementation of the certified energy saving system, this Plan considers alternative measures, such as **strategic, regulatory, aid and tax mechanisms** to enable the widest and fastest penetration of energy-efficient technologies in the market. 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 complements the measures of the entire NECP.

Alternative measures include the investments provided for in the 2012-2024 Infrastructure, Transport and Housing Plan (PITVI) of the Ministry of Transport, Mobility and the Urban Agenda, according to which it will be promoted to improve the energy efficiency of the conventional rail system, making it more efficient and competitive and enabling it to be geared towards meeting, to a greater extent, the needs of everyday metropolitan mobility and freight. In parallel, energy efficiency measures in aviation and maritime transport will be promoted. For its part, the Secure, Sustainable and Connected Mobility Strategy 2030 adopted in December 2021 aims to transform the sector around three main axes: the massive introduction of technology into mobility, the need to decarbonise the economy and the importance of connectivity in view of the uneven concentration of the population in the territory.

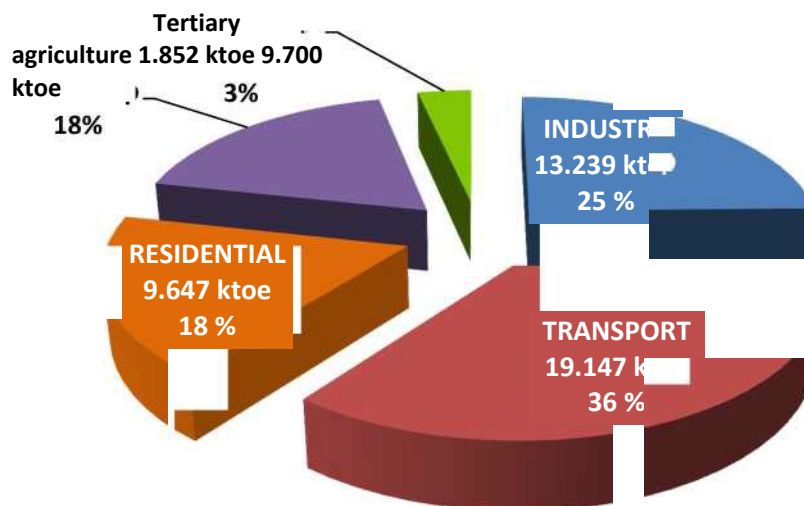
The tax measures include Law 7/2021 of 20 May on climate change and energy transition, which sets out a series of measures, including the limitation of the application of new tax benefits to fossil-based energy products, the inclusion of an additional allocation in the General State Budget to contribute to the objectives set for climate change energy transition, the promotion of green

taxation, as well as the amendment of Law 15/2012 of 27 December 2003 on fiscal measures for energy sustainability.

This Plan, in the Energy Efficiency Dimension, presents 23 measures with the aim of meeting the cumulative savings obligation stemming from the Energy Efficiency Directive.

For the current obligation period, 2021-2030, the Ministry for the Ecological Transition and the Demographic Challenge has made a forecast in which the transport sector is expected to contribute most to the cumulative final energy savings target for the period 2021-2030, assigning it a savings target of 19 Mtoe, representing 36 % of the cumulative energy savings target in the period. It is followed by the industrial sector, with a cumulative savings target of 13 Mtoe for the period, which represents 25 % of the target. The residential and tertiary sectors have a similar saving target of 9,6 Mtoe, each accounting for 18 % of the total. Finally, the agriculture and fisheries sector makes a smaller contribution, with 1,9 Mtoe (3 %) of cumulative savings:

**Figure 3.3. Cumulative final energy saving by Sector in Spain 2021-2030 (ktoe)<sup>76</sup>**



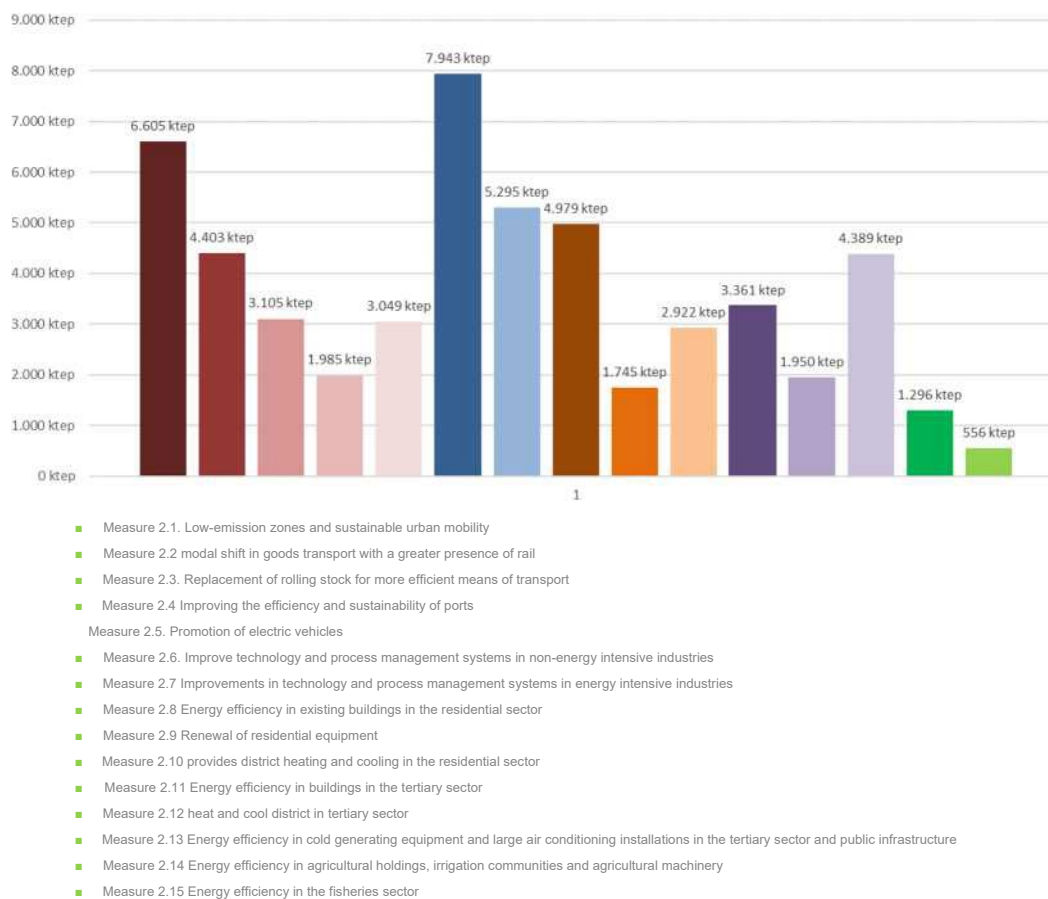
*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

Thus, the total cumulative volume of final energy savings for the period 2021-2030 achieved by the eleven sectoral measures would amount to 53.583,7 ktoe. Further details can be found in Annex F.

The following 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)**

<sup>76</sup>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.



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

The 15 measures included in the graph above are subdivided into instruments. Some of 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 Sustainable Mobility Law, the Secure, Sustainable and Connected Mobility Strategy 2030, Royal Decree 1052/2022 regulating low-emission zones, will be implemented in the period 2021-2030. The new municipal regulations to restrict access, traffic and parking to the most polluting and emitting vehicles in municipalities with more than 50,000 inhabitants, island territories and municipalities with more than 20,000 inhabitants that exceed the emission limit values 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 reduce final energy consumption, carbon dioxide emissions and to improve air quality by taking action on urban and metropolitan mobility through major changes in the modal split, with greater involvement of the most efficient modes, to the detriment of the use of low-occupancy private vehicles, encouraging the use of collective public transport and non-energy-consuming modes such as walking and cycling, as well as car pooling and car sharing and public transport with a particular focus on local transport. In this regard, it is important to stress the importance, in order to promote energy efficiency and less emitting and polluting modes, of having urban design appropriate to sustainable mobility parameters. It is particularly relevant when new developments are undertaken to ensure that the sustainable mobility variable is incorporated from the very beginning of the design

modification.

The measure aims to reduce the use of private vehicles, especially those with combustion engines, so that this NECP considers it feasible to reduce traffic in urban environments by 41.3 % until 2030 and metropolitan traffic by around 1.5 % per year; teleworking, car-sharing, the use of non-motorised means and collective public transport will make it possible to achieve these objectives, and it is of great importance to enable adequate public transport funding to improve quality and service, attract more users and thus contribute to improving air quality in urban environments.

In order to encourage changes in transport demand, full use should be made of the opportunities offered by digitalisation involving information and communication technologies (ICT), applied to mobility management (fleet management, parking facilities, traffic restrictions, autonomous vehicles, etc.), the concept of mobility as a service (*Mobility as a Service*), and payment for use or payment per service as opposed to payment by property, a concept increasingly rooted in new generations.

**One of the drivers of change is the establishment of low-emission zones by 2023 in all cities with more than 50.000 inhabitants on the national territory, as well as in island territories and municipalities with more than 20.000 inhabitants in which the limit values for pollutants regulated in Royal Decree 102/2011 of 28 January on improving air quality are exceeded, i.e. the delimitation of zones with access, circulation and parking limited to the most emitting and polluting vehicles.** This measure aims at transforming cities to ensure better quality of life through improved air quality. The measure includes a wide range of actions to support investments in infrastructure that will enable the necessary modal shift. The guidelines drawn up by MITECO to guide the design and implementation of low-emission zones by local authorities have been developed in cooperation with the Spanish Federation of Municipalities and Provinces, since 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 launched since 2015 by the FNEE. In this Plan, the participation and coordination of all territorial administrations, as well as the participation of private initiatives and, in particular, financial institutions, are essential for mobilising investment. In addition, promoting coordination in the development of regional legislation on 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, since it is at this higher level of planning that provisions and criteria are adopted which then take the form of infrastructure and urban development projects on which mobility and transport modes have been heavily conditioned. This is consistent with the Safe, Sustainable and Connected Mobility Strategy 2030 and the Spanish Urban Agenda of MITMA.

Specifically, the implementation of the measures contained in the **Sustainable Urban Mobility Plans will be promoted through public support programmes**, 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 resources determined in this regard), and **of plans for transport to work**, implemented by companies.

This measure is consistent with the priorities set out in Articles 102 and 103 on sustainable mobility of Law 2/2011 on 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 interim period**

The estimated savings of the measure are about **6.604,7 ktOE of cumulative final energy savings over the period 2021-2030**, out of a total of 19.146 ktOE representing the total transport sector.

**c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure are MITECO and MITMA (in coordination with other ministerial departments with cross-cutting responsibilities in the field of transport), together with the Autonomous Communities and, in particular, the local authorities.

**d) Sectors addressed**

This measure is addressed to municipalities, counties, lobbyists and other bodies representing supramunicipal territory, as well as publicly or privately owned workplaces and companies or centres of activity (railway stations, industrial sites, educational or health centres, universities, leisure parks, shopping centres, etc.). Similarly, authorities and transport companies.

**e) Eligible actions**

The eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption, through major changes in compliance with the EBAs or the planned changes for urban and metropolitan sustainable mobility:

**Implementation and development of Sustainable Urban Mobility Plans (SUMP):** measures such as the generalisation by 2023 of all cities with more than 50.000 inhabitants in Spain and island territories of the delimitation of low-emission zones with access, circulation and parking restricted to the most polluting and emitting vehicles (also included in Law 7/2021 of 20 May on Climate Change and Energy Transition).

It will also promote the regulation of public land cover 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 Marc Planorshort-term<sup>77</sup> action in the event of ambient air pollution events, the promotion of car-sharing, parking regulation, the promotion of cycling, the improvement and promotion of public transport, etc.

**The implementation and development of Transport to Work Plans (PTT):** measures such as shared mobility services in companies, promotion of cycling, promotion of public transport, and other measures associated with demand management such as teleworking, dynamic shift management, time flexibility, etc.

#### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Strategic documents: The State Bicycle Strategy 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 from the AAs. PP., such as the business sector and civil society. The Bicycle Strategy is considered to be one of the key actions within the Secure, Sustainable and Connected Mobility Strategy 2030, and is included under policy window 1, 'Mobility for All'.

**Legislative measures:** Law 7/2021, of 20 May, on Climate Change and Energy Transition. By means of the future Sustainable Mobility Act, an amendment to Article 103 of Law 2/2011 on the sustainable economy ('Preparation of transport plans in companies'), requiring it to be implemented for companies with more than 500 workers or more than 250 workers per shift (large companies) and the creation for such companies of the role of mobility coordinator, in order to increase the number of companies with a PTT.

Other legislative measures will be those implementing the relevant Autonomous Community mobility laws in their respective areas of competence, as well as in municipal regulations and other municipal regulations, especially in towns with more than 50.000 inhabitants concerning restrictions on private traffic, parking management, car sharing, traffic setting 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 adopted are the Guidelines for the Establishment of Low-Emission Zones<sup>78</sup> and Royal Decree 1052/2022 of 27 December regulating low emission zones, as well as the ordinances and other municipal regulations establishing such low emission zones.

It is envisaged that a **Sustainable Mobility Law** will be drawn up, which is one of the reforms committed by Spain under the PRTR. This standard will comprehensively address society's needs in the face of new models and requirements related to mobility and will regulate activities related to transport and mobility, including issues related to the planning and financing of transport infrastructure and services, improved governance, alternative fuels, inclusive mobility, fostering innovation and digitalisation, improving transparency and accountability.

It is also relevant to Law 10/2021 on remote working, which governs remote working, understood as working in 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 for energy saving and efficiency measures of the AGE and state institutional public

<sup>77</sup>[https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/09072021planepisodios\\_tcm30-529218.pdf](https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/09072021planepisodios_tcm30-529218.pdf)

<sup>78</sup>[https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/directricesparalacreafzonasdebajasemiiones\\_tcm30-533017.pdf](https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/directricesparalacreafzonasdebajasemiiones_tcm30-533017.pdf)

sector entities, including sustainable mobility measures and the strengthening of remote working.

**Public aid programmes:** programmes promoting the implementation of the measures and actions contained in the Sustainable Urban Mobility Plans and the Transport to Work Plans;

- **Low Emissions areas<sup>79</sup>.** Under the PRTR, MITMA has already boosted EUR 1.500 billion to improve air quality and reduce noise in cities, deploy zero-emission alternative fuel fleets and promote cycling infrastructure and pedestrian routes for alternative and active mobility. The first call that mobilised EUR 1.000 million has enabled projects to be launched in 171 municipalities with more than 20.000 inhabitants, and two supramunicipal bodies, which in turn bring together 86 municipalities. Eligible actions include accelerating the deployment of pedestrian zones and routes in the city centre and encouraging the use of cycling and other means of personal transport through the construction of cycle paths, the adaptation of roads and urban space, the provision of safe parking facilities and the deployment of bicycle rental services, measures to calm road traffic, the construction of parks for deterrence and the establishment of unregulated parking areas outside low-emission zones.
- **DUS 5.00080.** The DUS 5.000 programme aims to contribute to the energy transition and the generation of activity in municipalities and settlements 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 participation of municipalities in the deployment of recharging infrastructure and boosting electric vehicle.

**Information:** development and updating of guides and manuals on sustainable urban mobility; maintenance, on the website of MITECO and IDAE, of a platform aimed at citizens and mobility managers, including such guides, as well as useful information to promote the implementation of the Sustainable Urban Mobility Plans and the Transport to Work Plans; support for the establishment of Mobility Observatories in different policy areas, fora and working tables on sustainable mobility.

**Communication:** carrying out specific communication and information campaigns to encourage modal shift and rational use of private vehicles in urban journeys; development and promotion of institutional campaigns promoting public transport and supporting new sustainable mobility, including the award of prizes and awards to exemplary projects.

#### g) Financial needs and public support

This investment is being co-financed with RRF funds through investment C1.I1 with EUR 1.500 million directed to local authorities to finance projects to set up low-emission zones, transform photos of urban public transport vehicles and collect waste into 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 going to the Autonomous Communities for similar projects within their remit.

In addition, the MITMA (PRTR) will allocate more than EUR 1.502 million to nearby infrastructure.

It could also be co-financed by the ERDF under the Operational Programme for the period 2021-2027.

The SNOEE will also allow the obliged parties to invest, through the Energy Saving Certificates System (PECA) described in Measure 2.23, in the most efficient way possible in both replicable and unique actions, by issuing and settling the corresponding certificates; for example, to promote energy efficiency through company mobility schemes.

<sup>79</sup><https://www.mitma.gob.es/ministerio/proyectos-singulares/prtr/transporte/ayudas-municipios-para-implementation-zone-low-emissions>

<sup>80</sup><https://www.idae.es/ayudas-y-financiacion/programa-dus-5000-ayudas-para-inversiones-proyectos-singulares-premises-de>

## 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 encouraging actions that boost rail 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 transport large volumes of goods with the lowest fuel consumption and gaseous pollutant emissions.

In this regard, axis 6.1 of the Mobility Strategy approved by the Council of Ministers on 10 December 2021 provides for the effective increase in rail freight transport. In particular, a series of short- and medium-term actions and impact measures have been identified, the implementation of which by 2030 will increase the modal share of rail freight to 10 %. The following should be highlighted:

- Identification of priority actions on the rail freight network.
- Creation of a catalogue of logistic and intermodal nodes in Spain.
- Eco-incentive *scheme* to reduce external costs of transport.
- Promotion of railway motorways.

The transport of goods in Spain is mainly carried out unimodal, using a single mode of transport, mainly road. However, when it is necessary to transport goods over longer distances, such as between countries, multimodal transport is used, combining different modes of transport, such as road, rail, sea or air cargo. Intermodal transport plays an important role in this type of transport, as it allows goods to be transferred from one means of transport to another, using 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 figure is significantly lower than the European average of 17.6 %. In 2018, the European rail system transported around 1.600 million tonnes of goods, of which Spain contributed 28 million tonnes, accounting for 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 logistic chains, its scope being the rail network on which freight traffic circulates or could circulate, mainly the General Interest Rail Network and privately owned freight forwarders. To this end, it identifies short- and medium-term actions and measures, the implementation of which will increase the modal share of rail freight from the current 4 % to 10 % in 2030, reducing the negative externalities of transport, including:

- Provide an efficient and competitive rail network, prioritising the most impactful actions such as: extension of section tracks for 740 m trains, electrification to 25 kV of non-electrified freight lines, rehabilitation and upgrading of lines already electrified, and actions on arterial networks to improve freight traffic.
- Increase the performance of rail freight terminals, developing rail freight nodes to boost intermodality, adapting them to the requirements of logistics chains, covering the needs of services to businesses and crews, freight and vehicles. The objective is to have a network of strategic intermodal nodes in 2030.
- Strengthen rail connections with ports, boosting the actions foreseen in the FFATP, and the analysis of spaces at terminals to boost logistics spaces for urban freight distribution.
- Improve capacity management, removing bottlenecks, encouraging the movement of longer trains and prioritising actions that favour the reduction of operations.
- In order to promote international rail freight traffic, promote multimodality by providing corridors for rail motorway services – both in standard and Iberian gauge – including gauges 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

81 <https://www.mitma.gob.es/ferrocarriles/mercancias-30>

### interim period

The measure targets **cumulative final energy savings** over the period 2021-2030 of 4.403,1 ktoe out of a total of 19.146 ktoe representing the total of the transport sector.

#### c) Bodies responsible

The public authorities responsible for the implementation and monitoring of the measure will continue to be MITMA, MITECO and, where appropriate, together with the Autonomous Communities, in accordance with a co-management and co-financing model that respects Spain's distribution of competences.

#### d) Sectors addressed

This measure is aimed at companies and entities, both public and private, with fleets of road or rail transport vehicles, goods vehicles or works 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 business concentration of 197.000 companies.

#### e) Eligible actions

Eligible actions include:

- The definition, programming and implementation of actions for the progressive electrification of non-electrified 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 to ports that already concentrate a major railway activity and whose current accesses have outdated configurations that limit traffic growth.
- The definition, scheduling and implementation of actions on the arterial rail freight network in large cities, where freight traffic shares capacity with passenger traffic, especially with Cercanías.
- Creation of Railway Motorways (AF). AF are rail freight services which load road tracks or semi-trailers using specialised wagons. They are an additional segment of combined rail-road transport than maritime containers and swap bodies. Its purpose is therefore to provide a competitive logistics solution by exploiting the synergies between these two modes of transport, resulting in operational and external cost savings.

#### f) Mechanisms for action

##### Legislative measures:

- Draft Sustainable Mobility Act
- Mobility Strategy of December 2021
- Law 7/2021 on Climate Change and Energy Transition

**Public aid programmes:** non-repayable business support programmes.

- **Actions to digitise transport<sup>82</sup>.** It includes the following actions:
  - Interoperability in rail freight transport.
  - Promotion of transport intermodality.
  - Modernisation of railway freight equipment.
  - Safe, sustainable and connected road transport.
  - Digitalisation of transport.

The PPA system will enable those subject to the SNOEE to invest as efficiently as possible in actions, both replicable and unique, 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 compared to other modes.

**Agreements:** Signing of connecting agreements in ports which do not currently have a signed

---

<sup>82</sup>[https://sede.mitma.gob.es/SEDE\\_electronics/LANG\\_CASTELLANO/OFFICIES\\_SECTORIAL/SUB\\_PRTR/Enterprise\\_aid\\_competition/](https://sede.mitma.gob.es/SEDE_electronics/LANG_CASTELLANO/OFFICIES_SECTORIAL/SUB_PRTR/Enterprise_aid_competition/)



agreement. These Conventions lay down the rules for the physical and functional connection of Adif's infrastructure and the public authorities that make up the ferro-port complexes.

**Communication:** development of demonstration and promotion actions aimed at businesses. Citizen communication campaigns to promote shared mobility services, efficient driving and rational use of transport modes.

**ECO-INCENTIVES:** The development of this programme of an ECO-INCENTIVE programme will be carried out by granting public aid and subsidies to transport users or 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 – funded by the European Union – NextGenerationEU.

### **(g) Financial needs and public support**

MITMA, under PRTR, Component 6, plans EUR 1.101 million of direct investments in railway infrastructure not included in the core network, EUR 217 million in intermodal terminals, EUR 250 million in external rail access to ports.

## Measure 2.3 Renewal of rolling stock from more efficient means of transport and 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.

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 navigation systems for land transport by road, in the automation of the rail passenger system or in strategic elements of the maritime fleet.

In the rail sector, in particular, digitalisation and energy efficiency are two key aspects in developing and improving the sustainability of this sector. The implementation of intelligent rail traffic management systems facilitates better planning and coordination of trains, optimises track capacity, reduces waiting times and improves the operational efficiency of the system. In turn, predictive digitalisation can be implemented, using sensors and monitoring technologies to collect real-time data on the condition of trains and railway infrastructure.

In the field of land freight transport, digitalisation will lead to improved productivity, lower operating costs 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 analysis 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 interim period**

The objective of the measure is additional 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 19.146 ktoe representing the total transport sector, promoting fleet renewal towards more efficient vehicles.

### **c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure are the Ministry of Finance, which is responsible for the tax reform of the General State Administration, the local authorities and the regional authorities, responsible for certain taxes affecting the motor vehicle, such as the tax on motor vehicles (IVTM) and the special tax on certain means of transport (EIDHR) or registration tax. The Directorate-General for Traffic and MITECO are responsible for updating the environmental labelling of vehicles.

**d) Sectors addressed**

This measure is aimed at the general public and companies with vehicle fleets.

**e) Eligible actions**

Purchases of road transport vehicles and services

Renewal of railway equipment

Maritime fleet renewal and equipment

**f) Mechanisms for action****Legislative measures:****Law 7/2021 of 20 May 2010 on Climate Change and Energy Transition**

**New CO<sub>2</sub>Emissions Regulation.** The amendment of Regulation 2019/631 on CO<sub>2</sub> emissions from new and light commercial passenger cars by Regulation 2023/851 as part of the 'Fit for 55' package means that manufacturers register vehicles in 2025 with 15 % lower CO<sub>2</sub>emissions on average compared to the limit set in 2020 and 2030, achieve 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 of the new light commercial vehicles fleet shall amount to a 100 % reduction in emissions compared to the target in 2021.

Similarly, the revision of Regulation (EU) 2019/1242 of the European Parliament and of the Council of 20 June 2019 setting CO<sub>2</sub> emission performance standards for new heavy-duty vehicles will be particularly relevant for the renewal of the heavy-duty vehicle fleet towards more efficient vehicles.

**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 percentage purchase of clean vehicles from the Member States.

**Funding programmes:** Creation of financing instruments, through partnership agreements with financial institutions, aimed at SMEs and self-employed in the freight transport and taxi services sector, to encourage the renewal of their vehicles, as they may have difficulties in finding financing on ordinary channels, incentivising such renovation to be directed 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

**g) Financial needs and public support**

The total associated investment by individuals and businesses is estimated at EUR 76.680 million<sup>83</sup> for the period 2021-2030.

**h) Preventive, corrective and compensatory measures for potential negative effects**

The renewal of the car fleet will lead to an increase in waste production.

The ESAE of the NECP states that mitigation measures related to the generation of waste from obsolete equipment, electronic equipment and vehicles will be implemented.

---

<sup>83</sup>The total associated investment has been calculated on the basis of the total amount of the new vehicle.

## Measure 2.4. Improving the energy efficiency of ports

### a) Description

The objective of this measure is to reduce energy consumption, and emissions linked to their production, in buildings and services provided in ports, including publicly owned ports, and in activities carried out by port companies.

Port infrastructure will lead to improved insulation and energy use of buildings, use of efficient lighting systems, implementation of low-energy air-conditioning equipment and efficient management of port facility and logistics.

### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The measure will provide savings over the period 2021-2030 of **1.984,9 ktoe of savings** of a total of 19.146 ktoe.

### c) Bodies responsible

The AGE, through MITMA, State Ports and Port Authorities, the Autonomous Communities within its remit and those responsible for private marinas.

### d) Sectors addressed

Service, technology and construction companies operating in the field of ports.

### e) 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 ships, vehicles, machinery and equipment in the port environment
- awareness-raising training.

### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

#### Legislative measures:

Law 7/2021, of 20 May, on climate change and energy transition.

Draft Sustainable Mobility Act

Mobility Strategy of December 2021

Strategy for the sustainability of the Puertos del Estado port system.

#### Other accompanying measures:

The measures that Puertos del Estado included in the energy efficiency section of its strategy for the sustainability of the port system are proposed below.

- Institutional recommendations: Publication of an Energy Management Guide in Ports of recommendations on energy efficiency measures.
- Economic incentive: Reduction of the activity rate of operators who sign good practice agreements with the Port Authority, incentivising energy-saving measures in energy-intensive activities.
- Energy procurement and commercialisation: Progressive regularisation of the tasks of
- distribution and marketing of energy in ports. The aim is to pass on actual energy market prices to port users, thus achieving a more efficient use and management of energy by port users.
- Infrastructure: Investments in the following improvement actions:

- Control: Real-time measurement and monitoring at all consumption points.
- Distribution: Improvement of the port distribution and transformation network.
- Lighting: Adaptation to LED systems, with regulation according to the level of activity, on public roads and buildings.
- Air conditioning: Improving the insulation of port authorities' buildings and heat pump air conditioning, with the use of geothermia being explored in some ports.

**Public aid programmes**

MITMA, under PRTR, Component 6, will invest EUR 463 million to improve port accessibility and sustainability.

**Economic incentives:**

These actions may benefit from the CAE system.

## Measure 2.5. Promotion of electric vehicles

### a) Description

The objective of this measure is to increase the energy efficiency of the transport sector and to reduce the energy consumption of the car fleet through the electrification of the fleet, which will be achieved by gradually replacing combustion vehicles with vehicles powered by electric propulsion (encompassing both battery electric vehicles and those with fuel cell and using green hydrogen), enabling greater penetration of renewable energies in the transport sector.

In the framework of the 'Fit for 55' package, the European Commission, together with the Council and the European Parliament, has agreed on a ban on the sale of new vehicles that are not zero-emission from 2035 on Community territory, in accordance with Regulation 2023/851 on reductions of CO<sub>2</sub> from new passenger cars and new light commercial vehicles. This agreement brings forward Spain's commitment in Law 7/2021 of 20 May on Climate Change and Energy Transition that by 2040 all sales of vehicles will be vehicles with emissions of 0 gCO<sub>2</sub>/km.

At the end of 2022, the market share of electric vehicles in Spain was 8 %, including battery electric, plug-in hybrid and extended electric vehicles.

In the framework of the PRTR, Spain has accelerated the measures, both legislative and financial support, to enable the penetration of electric vehicles to be achieved in order to meet the objective set out in the 'Objective 55' agreement.

Massive electrification of the vehicle fleet will be achieved when parity in total cost of ownership between electric vehicles and combustion vehicles is reached (either by approximating selling prices facilitated by manufacturers or by the existence of tax incentives) and where 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 within the general framework of the PRTR, which outlines the roadmap for the modernisation of the Spanish economy, one of the thirty lines of action 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 a key to driving the electric vehicle. This shock plan will make it possible to bring forward the electric mobility penetration targets that Spain had set for 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 the development of an Ecosystem for Electric and Connected Vehicle Manufacturing (PERTE VEC) as a Strategic Project for Economic Recovery and Transformation as a comprehensive initiative on the industrial value chain of electric and connected vehicles with a clear and defined objective: the creation of the ecosystem needed to enable the electric and connected vehicle in Spain to be manufactured and developed comprehensively. To this end, the PERTE VEC will make it possible to articulate the public investments of the different components of the plan, and to coordinate the actions of the various links in the value chain, in order to achieve the desired impact in terms of efficient transformation of the sector. To this end, the PERTE VEC lists MOVES incentive programmes as enabling measures that, without acting directly on the value chain, contribute to both the creation of new mobility and the development of electric vehicles, in this case, making it possible to boost the fleet of electric vehicles, the deployment of infrastructure and innovation and new business models in electric mobility.

Also under the PRTR and as part of Component 9, the Hydrogen Roadmap has been approved: A commitment to renewable hydrogen, which envisages encouraging the use of green hydrogen in certain niches of the transport sector that are difficult to decarbonise through battery electrification.

A key aspect for the progressive deployment of public recharging infrastructure will be the adoption of the Alternative Fuels Infrastructure Deployment Regulation, which will replace Directive 94/2014 of 29 September 2014 on the deployment of trans-European alternative fuels infrastructure with binding targets for the deployment of both potential and capillarity of recharging points for all Member States.

In this context, the Task Force for the Deployment of Charging Infrastructure (GTIRVE) has been established as the governance body for deployment in Spain.

The development of electric vehicles and their charging infrastructure also has an impact on the energy security dimension (see Measure 3.4), as well as on the provision of complementary services to the electricity system through the development of bi-directional charging (V2G) and aggregation, which will enable greater integration of renewables (see Measures 1.3 and 4.4).

Finally, mention should be made of the alignment of the objectives of electrification of the vehicle fleet with the Roadmap for the sustainable management of mineral raw materials and the action lines of the Spanish Circular 2030 Strategy. In particular, the recovery of materials such as lithium, nickel or cobalt and retrofit from vehicles will be new niches of activity in the electric mobility ecosystem.

**b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period**

The measure will provide savings over the period 2021-2030 of **3.049 ktoe of savings** of a total of 19.146 ktoe. The update of the NECP estimates that **an electric vehicle fleet of 5.450.000 will be reached by 2030** (cars, vans, buses and motorcycles).

**c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure will continue to be MITECO, in coordination with other ministerial departments and, in particular, with MITMA, MINCOTUR and the Ministry of Finance and the Civil Service, together with the Autonomous Communities, in accordance with a model of co-management and co-financing of legislative and energy efficiency measures and measures that respect Spain's distribution of competences. The local authorities shall be administrations involved in the measure as a result of the exercise of their powers in the field of air quality control in cities.

**d) Sectors addressed**

This measure targets the general public and companies with vehicle fleets, as well as companies engaged in the deployment, operation and provision of recharging infrastructure services.

**e) Eligible actions**

The eligible actions in the measure include:

- The purchase of new electric vehicles
- Deployment of electric vehicle charging infrastructure
- Innovative projects in electric mobility

**f) Mechanisms for action**

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Legislative measures:** The promotion of electric mobility requires an adaptation of the regulatory framework to accelerate the deployment of charging infrastructure. In this regard, the following measures are listed:

- Royal Decree 184/2022, of 8 March, regulating the activity of providing energy recharging services for electric vehicles.
- Establishment of the obligation to install high-power recharging points at certain service stations from a volume of fuel sales (stations with higher traffic volumes), by means of Law 7/2021 of 20 May 2021 on Climate Change and Energy Transition and Royal Decree-Law 29/2021 of 21 December 2021 adopting urgent measures in the energy field to promote electric mobility, self-consumption and the deployment of renewable energy.
- Obligation to deploy recharging points in car parks attached to existing buildings in the tertiary sector with more than 20 parking spaces, through publication of Royal Decree-Law 29/2021 of 21 December.
- Obligation to install pre-installation and recharging 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 in service stations, as laid down in Royal Decree-Law 27/2021 of 23 November 2021 prolonging certain economic

measures to support the recovery.

- Declaration of public utility of charging infrastructure connections above 250 kW, by means of Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and in other areas for economic recovery.
- Removal of the requirement for a prior construction licence for recharging points, replacing it with a responsible declaration, in accordance with the provisions of Royal Law 29/2021 of 21 December 2007.
- Simplification of the regulatory process for the installation of recharging points on State roads, in accordance with Order TMA/178/2020 of 19 February amending the Order of 16 December 1997 regulating access to State roads, service roads and the construction of service facilities. Regulation (EU) 2019/1242 amended Directive 96/53/EC by allowing to increase the maximum authorised mass of alternatively fuelled or zero-emission vehicles to a maximum of 1 tonnes or 2 tonnes respectively, as well as to increase the maximum authorised mass for combinations 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 a credit mechanism (e-credits) that recognises electricity, among other energy alternatives, for the supply of vehicles, according to 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 supplying renewable electricity to electric vehicles through public recharging stations, among other energy sources, will get credits that can be counted towards the targets 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 demonstrate compliance with the targets laid down in Royal Decree 1085/2015 of 4 December 2014 on the promotion of biofuels and in its most recent amendment by Royal Decree 376/2022 of 17 May 2006 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, the 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 electricity, such as hydrogen and other renewable synthetic fuels, because there is no obligation on these or mechanism for their accounting.

The introduction of this new e-credits mechanism will make it possible to count these appropriations to cover the obligations arising from the transposition of the provisions of the proposed amendment to the Renewable Energy Directive, as well as the creation of an enabling framework for encouraging the use of alternative vehicles.

#### **Other accompanying measures to promote electric mobility:**

- An exemplary role of the Administration, with obligations to renew the minimum fleet with zero- and low-emission vehicles to be put out to tender by the various contracting authorities of public administrations, in accordance with Law 24/2021 of 2 November 2003 transposing European Union Directives on covered bonds, cross-border distribution of collective investment undertakings, open data and re-use of public sector information, the exercise of copyright and related rights applicable to certain online transmissions and retransmissions of radio and television programmes, temporary exemptions from certain imports and supplies, from 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 electric mobility value chain.

**Public aid programmes:** design of non-repayable support programmes that multiply the budget made available to individuals and companies for the purchase of electric vehicles, as well as the installation of charging points and innovative projects.

In the period 2020-2023, Next Generation funds are available under the PRTR to accelerate 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 allocation of up to EUR 1.200 million.
- The MOVES FLOTAS programme, with incentives for companies that purchase at least 25 light electric vehicles and operate in at least two Autonomous Communities, to renew their fleet and have recharging at their facilities, with a first call for applications of EUR 50 million and a further EUR 50 million in its 2th call.
- Programme to transform fleets of commercial heavy goods and passenger road vehicles, with EUR 400 million.
- Programme MOVES Singulares 2, aimed at incentivising individual electric mobility projects, with EUR 100 million in its first call and EUR 264 million in the second call.

#### **Economic incentives:**

- Relaxation of the toll and charge for charging electric vehicles, through CNMC Circular 3/2020
- Possibility for municipalities to introduce tax reductions for the activity of recharging vehicles, through Royal Decree-Law 29/2021 of 21 December.

**Taxation:** the Ministry of Finance will analyse the desirability and feasibility of a tax reform in the automotive sector aimed at internalising the environmental externalities of fossil fuels, which could include, inter alia, the reform of the Special Tax on Certain Means of Transport (EIDHR) or registration tax to update the CO<sub>2</sub> emission thresholds from which the imputation<sup>84</sup> or other taxes on the purchase or use of the vehicle are paid.

The reform would make it possible to bring forward price parity between combustion vehicles and electric vehicles, which would help to speed up the penetration of electric vehicles by directing the public towards the purchase of zero-emission vehicles.

**Communication:** design of an *ad hoc* communication strategy focused on providing information on the electric vehicle, the price and location of recharging points, supply, vehicle performance, etc.

It is important to mention the ongoing European projects involving Spain: PSA “Data collection related to rejection/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 in which 16 European countries participate. The first project will provide a national access point to the network of recharging points, both electric and hydrogen, by providing a visual map of these points, as well as their identification with unique code, providing their coordinates and other relevant information for citizens, on the geoportal on the MITECO website. The second has been translated into the euros/100km website<sup>85</sup>, which will enable the public to have information allowing them to compare the costs of refuelling the different types of vehicles, thus meeting the requirements of Directive 2014/94/EU.

The communication strategy will use the most specialised and non-specialised impact channels: MITECO geoportal, web platforms, smartphone applications, social media, conferences and events.

#### **g) 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 million<sup>86</sup>. The estimated public financial support for the development of this measure in the period 2021-2025 (Next Generation EU funds) amounts to EUR 2.000 million for the promotion of the electrification of the light vehicle, plus EUR 400 million for the HGV fleet transformation programme. In addition, other funding lines aimed at municipalities (1.500 million) and 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 recharging points in their bearings for such vehicles. In the period 2025-2030 it is estimated that the price parity on light-duty vehicles will be reached and no public support for the purchase of vehicles will be needed, although a budgetary envelope

<sup>84</sup>74 % of vehicles currently registered do not pay this tax because they do not exceed the limit of 120 gCO<sub>2</sub> per km.

<sup>85</sup><https://eurospor100km.energia.gob.es/Paginas/Index.aspx>

<sup>86</sup>The total associated investment has been calculated on the basis of 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 above assessment considers exclusively the difference between the investment that would be made in a conventional vehicle when renewing the vehicle (baseline scenario) and that made in the target scenario of the Plan 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 a much lower amount than the total amount of the new vehicle.



will be needed to promote the deployment of recharging infrastructure.

## **Industrial sector**

### **Measure 2.6. Improvements in technology and process management systems in industries not 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 companies in the industrial sector that are not considered energy intensive. This measure will improve the energy efficiency of industrial processes and ensure final energy savings and thus significant reductions in GHG emissions.

The measure will promote, on the one hand, greater investment in both refurbishing and upgrading and replacing less energy efficient industrial equipment and installations with others using energy-efficient technologies or, directly, Best Available Techniques (BAT). It shall consider the replacement of all kinds of systems that consume energy in industrial processes or produce or transport steam or other heat orient fluids.

On the other hand, it will also promote more investment in the implementation of energy management systems in industry; these systems must include measures to measure energy consumption variables and the installation of elements for the regulation and control of process parameters and the implementation of IT and digital systems for analysis, regulation and control, in order to enable the installations to operate optimally, to reduce energy consumption and costs and to provide information quickly and accurately, which is necessary to improve the energy management of industrial 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.

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 from the implementation of energy management systems as described above, based on the actions mobilised, inter alia, by the National System of Obligations (SNOEE) either through investments justified by means of energy savings certificates (EPCs) or through aid programmes financed by the FNEE. 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 ERDF funds 2021-27, will be taken into account.

In line with the above, there are several strategic projects for economic recovery and transformation (PERTE) that support actions on energy efficiency and decarbonisation of national industry. In particular, the following should be highlighted:

- The objective of industrial decarbonisation, approved by the Council of Ministers on 27 December 2022, is to improve energy efficiency in industry, as it considers this to be an essential element in helping the decarbonisation and viability of the manufacturing sector, through the incorporation of the best available technologies into industries and the introduction 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 the diversification of the shipping industry into new products, its digitalisation, the improvement of its environmental sustainability and the skills of its employees. Within the policy area "*Transformative Value Chain Projects*", 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 out among its specific objectives and actions to promote innovation, sustainability and digitalisation in the aeronautical 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 interim period**

The measure aims to **achieve a cumulative final energy saving of 7.943,5 ktoe** in the period 2021 – 2030.

### c) Bodies responsible

The public authorities responsible for the implementation and monitoring of the measure will continue to be MITECO and MINCOTUR, in coordination with other ministries with responsibility for industrial policy, 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 respect the distribution of competences in Spain.

### d) Sectors addressed

This measure is addressed to companies in the industrial sector that do not qualify as energy intensive companies, preferably belonging to the manufacturing industry, as well as to energy service companies that invest in them on behalf of customers.

### e) Eligible actions

Eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption by improving industrial equipment and processes, implementing management systems, or carrying out training, dissemination and awareness-raising actions.

By analogy with the implementation programmes during the 2014-2020 period, actions considered not economically viable will not be eligible, meaning 'not viable' where the period of simple recovery of the eligible investment exceeds the useful life of the installation implemented.

Similarly, actions that do not comply with the principles and methodology for accounting for savings set out in the Energy Efficiency Directive, including those in the proposed revision of the Directive ('Fit for 55' legislative package), are also ineligible. Thus, energy efficiency actions that deal with the direct combustion of fossil fuels will not be eligible.

### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

#### **Energy savings certificate mechanism, PPA.**

**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 associations representing the most energy-intensive subsectors can lead to quicker adoption of efficient technologies in the industry sector.

**Normative:** Law 7/2021, of 20 May, on Climate Change and Energy Transition. Preliminary draft law on industry. Amendment of Directive 2012/27/EU of 25 October on energy efficiency, amendment of Directive 2010/75/EU of 24 November on industrial emissions (integrated pollution prevention and control), under which best practices in energy efficiency are to become mandatory, as well as the amendment of other directives in the 'Fit for 55' package and their corresponding transposition into Spanish law.

**Promotion of R & D & I:** by supporting the research and technological development of solutions to processes using cleaner energy sources or drastically improving the energy intensity of the process.

**Training: trained professionals in the deployment of new decarbonisation and energy efficiency technologies are needed.**

**Awareness-raising:** dissemination of the implications of the energy transition for the survival of businesses, climate and jobs.

### g) Financial needs and public support

#### **National System of Obligations:**

- **The Energy Savings Certificate System**, developed in Measure 2.23, will enable invest the subjects subject to the SNOEE as efficiently as possible in actions, both replicable and unique, issuing and clearing the corresponding certificates to promote energy efficiency in industrial processes that reduce the ratio of energy consumed per unit of product or service or incorporate energy management systems, as well as to reduce the payback period in energy performance contracts.

- **Support programmes under the EENF**

**Alternative measures:**

- **Support programmes under the industrial decarbonisation PERTE, the PERTE for the shipbuilding industry and the aerospace PERTE.**
- **Other public support programmes:** programmes of non-repayable aid or loans repayable at low interest within the framework of Community legislation on State aid which may be outside the National Obligations System.

## Measure 2.7. Improvements in industrial technology and process management systems energy intensive

### a) Description

The measure aims to facilitate the penetration of final energy saving techniques and technologies in energy intensive companies in the industrial sector. This measure will improve the energy efficiency of industrial processes, ensuring the achievement of final energy savings and thus significant reductions in GHG emissions.

The measure will promote, on the one hand, greater investment in both refurbishing and upgrading and replacing those industrial equipment and installations with the lowest energy efficiency with those using energy-efficient technologies or directly incorporating Best Available Techniques (BAT). It shall provide for the renovation or replacement of all types of energy-consuming systems in industrial processes, or producing or transporting steam or other calorific fluids.

It will also promote more investments in the deployment of energy management systems in industry. These systems should include the measurement of energy consumption variables, the regulation and control of process parameters and the tools necessary for the analysis of all the data collected, in order to be able to manage the operation of installations optimally from an energy point of view, reducing energy consumption and associated costs and providing information in a timely and accurate manner. In all cases, energy management systems must comply with standard UNE-EN ISO 50001 on energy management systems or similar and commonly accepted standards.

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 from the implementation of energy management systems as described above, based on the actions mobilised, inter alia, by the National System of Obligations (SNOEE) either through investments justified by means of energy savings certificates (EPCs) or through aid programmes financed by the FNEE. 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 ERDF funds 2021-27, will be taken into account.

In line with the above, the EPPERTE for industrial decarbonisation, approved by the Council of Ministers of 27 December 2022, has as one of its objectives the improvement of energy efficiency in industry, which it considers to be an essential element in helping the decarbonisation and viability of the manufacturing sector, through the incorporation of the best available technologies into industries and the introduction 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*.

### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The measure aims to **achieve a cumulative final energy saving of 5.295,4 ktoe** in the period 2021 – 2030.

### c) Bodies responsible

The public authorities responsible for the implementation and monitoring of the measure will continue to be MITECO and MINCOTUR, in coordination with other ministries with responsibility for industrial policy, 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 respect the distribution of competences in Spain.

### d) Sectors addressed

This measure is addressed to energy intensive companies in the industrial sector, as well as to energy service companies that invest in them on behalf of customers.

### e) Eligible actions

Eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption by improving industrial equipment and processes, implementing management systems or carrying out training, dissemination and awareness-raising actions.

By analogy with the implementation programmes during the 2014-2020 period, actions considered not economically viable will not be eligible, meaning 'not viable' where the period of simple recovery of the eligible investment exceeds the useful life of the installation implemented.

Similarly, actions that do not comply with the principles and methodology for accounting for savings set out in the Energy Efficiency Directive, including those in the proposed revision of the Directive ('Fit for 55' legislative package), are also ineligible. Thus, with the exception of certain exceptions set out in Annex V to the proposed text of the new Energy Efficiency Directive, energy efficiency measures relating to the direct combustion of fossil fuels will not be eligible.

#### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

##### **Energy savings certificate mechanism, PPA.**

**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 associations representing the most energy-intensive subsectors can lead to quicker adoption of efficient technologies in the industry sector.

**Normative:** Law 7/2021, of 20 May, on Climate Change and Energy Transition. Preliminary draft law on industry. Amendment of Directive 2012/27/EU of 25 October on energy efficiency, amendment of Directive 2010/75/EU of 24 November on industrial emissions (integrated pollution prevention and control), under which best practices in energy efficiency are to become mandatory, as well as the amendment of other directives in the 'Fit for 55' package and their corresponding transposition into Spanish law.

**Promotion of R & D & I:** by supporting the research and technological development of solutions to processes using cleaner energy sources or drastically improving the energy intensity of the process.

**Training: trained professionals in the deployment of new decarbonisation and energy efficiency technologies are needed.**

**Awareness** and dissemination of the implications of the energy transition for the survival of businesses, climate and jobs.

#### g) Financial needs and public support

##### **National System of Obligations:**

- **The Energy Savings Certificate System**, developed in Measure 2.23, will enable invest the subjects subject to the SNOEE as efficiently as possible in actions, both replicable and unique, issuing and clearing the corresponding certificates to promote energy efficiency in industrial processes that reduce the ratio of energy consumed per unit of product or service or incorporate energy management systems, as well as to reduce the payback period in energy performance contracts.
- **Support programmes under the EENF**

##### **Alternative measures:**

- **Support programmes under the Industrial Decarbonisation PERTE.**
- **Other public support programmes:** programmes of non-repayable aid or loans repayable at low interest within the framework of Community legislation on State aid which may be outside the National Obligations System.

Se estimates **public support of EUR 3.622 million.**

## Residential 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 buildings for residential use through energy renovation actions. The renovation must enable the energy rating of the building to be improved. This measure is fully consistent with the **Long-term Building Renovation Strategy (ERESEE 2020)**, drawn up by MITMA 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 PNIEC considers that the certification of the energy performance of buildings (Royal Decree 390/2021 of 1 June 2007 approving the basic procedure for the certification of the energy performance of buildings, which repeals Royal Decree 253/2013 of 5 April 2007) is a very valuable tool for developers 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 through actions on the thermal envelope of the building or on thermal heating and/or air conditioning and domestic hot water (DHW) installations, this Plan **prioritises investments over the thermal envelope** (façades, roofs and fencing) over improvements in thermal installations, considering that the reduction of thermal demand should first be addressed in order to avoid the over-sizing of heating or air-conditioning equipment that must meet this demand in application of the *first principle, energy efficiency*.

This measure was initially based on the **programme of aid for the energy renovation of existing buildings** launched in Spain in October 2013 under the name 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 success story precisely because more than 85 % of the funds channelled to energy renovation projects have been used for actions to improve the energy efficiency of the thermal envelope (PAREER-CRECE).

Currently, rehabilitation support in Spain is based on PRTR aid programmes. Component 2 of the Plan, led by the Ministry of Transport, Mobility and the Urban Agenda (MITMA), includes all programmes financed by NextGenerationEU funds as part of the Housing Rehabilitation and Urban Regeneration Plan.

This component of the PRTR includes the EUR 3.420 million aid programme for the comprehensive renovation of residential buildings and dwellings, which aims to boost the renovation of residential buildings, dwellings and neighbourhoods.

Similarly, component 2 of the PRTR includes the Programme of Aid 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 continue the programmes, PAREER-CRECE and PAREER II and have a budget of EUR 402,5 million and EUR 92,6 million.

In addition, also included in the PRTR, the Programme of Support for Rehabilitation Offices and the Programme to assist the preparation of the existing building book for renovation and the drafting of renovation projects, cover aspects of the renovation process which are not actions on buildings, but which are essential 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 enable those subject to the SNOEE to invest as efficiently as possible in actions for the energy renovation of buildings, both replicable and unique, by issuing and settling the corresponding certificates.

The basis of the public support is the Energy Performance Certificate of the building (EERC), which contains a description of the energy characteristics of the building as a starting point for making an energy diagnosis.

It should be noted that the EEC calculation system is under review for different reasons:

- Firstly, efforts are being made to adapt the escalation to criteria that more strictly reflect the desirability of investing in energy savings; i.e. by assigning the best letters to those buildings where the ratio of an investment in renovation to the energy savings it produces (EUR/kWh) is too high.

- Secondly, the calculation models of the different recognised documents need to be improved in order to bring the theoretical final energy consumption offered by the EEC closer to actual final consumption, as it is currently much higher.

In accordance with Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, and with the work currently being carried out at the beginning of the trilogues for its amendment, the EEC must contain information on all the elements that may be involved from an energy point of view (thermal envelope, thermal heating installations, 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.

The EERC itself should include recommendations for improving the optimal or cost-efficient levels of the energy performance 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 measures referred to in this measure will be carried out on the basis of the latest requirements set out in the Technical Building Code, as last amended by Royal Decree 450/2022 of 14 June 2022 and the Regulation on Thermal Installations in Buildings, as last amended by Royal Decree 178/2021 of 23 March.

It is important to note here that the current system of annual savings accounting results in a reduction in the effect of investments in renovation of buildings. This is because these are important investments, but have a saving effect for many years, even decades. Therefore, by attempting to rationalise investments on the basis of the savings achieved (as is the case with the energy savings certificate system (PPA)), by counting savings in only one year, and not the cumulative savings, there is a very significant distortion in favour of short-lived projects and against projects with a long lifespan.

It is therefore necessary to start the studies to propose the amendment of the current legislation (starting with Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency), and to take into account the cumulative savings resulting from energy efficiency measures, as is done in other neighbouring countries (e.g. France).

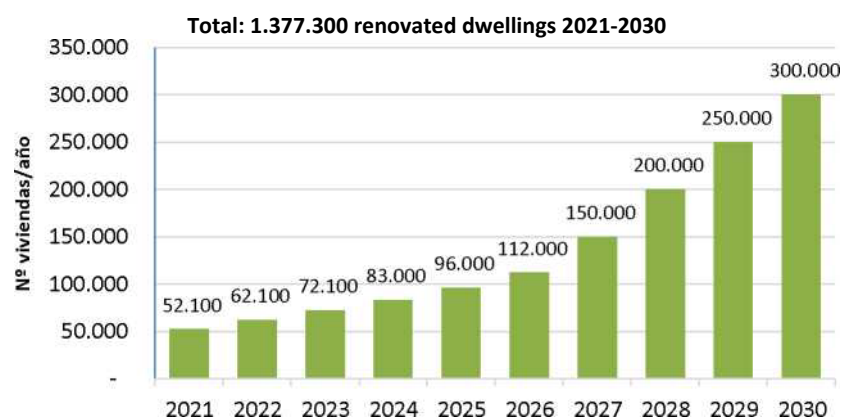
#### **b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period**

The measure aims to **achieve 4.979 ktoe of cumulative final energy savings** over the period 2021-2030, out of a total of **9.316,7 ktoe of savings** represented by the residential sector.

As a result of the aid programme for the integrated 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 approximately 80.000 dwellings per year.

This quantitative planning is indicative and the decisive factor for the objectives of this Plan is the total energy savings achieved. The precise renovation ratios of dwellings to be undertaken for each year will be precisely defined in the **Long-term Strategy for Energy Renovation in the Building Sector in Spain**, which is the responsibility of MITMA.

**Figure 3.5. Indicative annual forecast for energy renovated dwellings 2021-2030**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

#### **c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure will remain the MITMA, the Ministry of Finance and MITECO, together with the Autonomous Communities, in accordance with a model of co-management and co-financing of energy efficiency measures and actions that respect Spain's distribution of competences.

#### d) Sectors addressed

The beneficiaries of this measure will be owners of existing residential buildings, whether natural or legal persons, whether public or private, owners' associations or associations of owners of residential buildings, companies operating, tenants or concessionaires of residential buildings for residential use and, in any case, energy service companies and energy communities.

#### e) Eligible actions

The eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption by improving those services that have a greater weight in the energy consumption of buildings, such as heating, cooling and domestic hot water production:

- **Thermal envelope:** action shall 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 joinery, glass and sunscreen.
- **Thermal installations:** action will be taken on thermal installations for heating, air conditioning, domestic hot water production and ventilation, regulated by the RITE. The measure provides for the incorporation of thermal renewable energy sources to cover demand in accordance with the renewable final energy consumption targets considered in this Plan.
- **Information and communication technology (ICT):** use of monitoring, control and automation tools to manage equipment enabling efficient energy consumption:
- **Efficient heat and cold 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 level or at building level, may include actions, on an indicative and non-exhaustive basis, such as:

- Replacement of equipment for the production of heat and cold, for the movement of calorific fluids, including the improvement of the thermal insulation of piping networks and equipment to reduce losses in the transport of fluids.
- Installation of free outdoor air cooling and heat recovery systems from the exhaust air.
- Domotic systems or systems for monitoring and regulating equipment or installations with the aim of saving energy, as well as systems for accounting, telegalising and digitising energy consumption.
- New centralised district or district heating and cooling systems or serving several buildings, as well as the refurbishment and extension of existing ones.

#### f) Mechanisms for action

The policy mechanisms that will enable the expected savings targets to be achieved are as follows:

**Taxation:** the Ministry of Finance will lead a comprehensive analysis on taxation in the residential sector in order to internalise the positive externalities of improving the energy efficiency of buildings related to this sector. As a result of this work, [Law 10/2022 on urgent measures to boost building renovation activities](#) has been published in the context of the PRTR, amending Law 35/2006 of 28 November 1992 on Personal Income Tax (PIT), which approves:

- Deductions from personal income tax, applicable to amounts invested in renovation works,
- Aid granted under various programmes shall not be included in the personal income tax base. energy renovation of PRTR buildings, specifically:
  - *Royal Decree 737/2020 (PREE) of 4 August.* Aid programme for energy renovation measures in existing buildings.
    - *Royal Decree 477/2021, of 29 June.* Various incentive schemes linked to self-consumption and storage, using renewable energy sources, as well as the introduction of thermal renewable energy systems in the residential sector.
  - *Royal Decree 691/2021 (PREE 5.000) of 3 August.* Aid programme for energy renovation in existing buildings in municipalities facing demographic challenges.
    - *Royal Decree 853/2021, of 5 October,* on various support programmes for residential rehabilitation 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, very significant progress has been made in terms of planning and legislation:

- The Technical Building Code (CTE) has been amended several times in recent years: although Royal Decree 732/20219 of 20 December introduced requirements involving nominal reductions in non-renewable primary energy consumption for multi-family residential buildings (in bloc) of around 38 %, reaching up to 60 % in single-family buildings in winter areas, a new amendment to the CTE was published on 14 June 2022, the main novelty of which was the amendment of section HE5 (Minimum generation of electricity from renewable sources) and the creation of a new paragraph HE6 with regard to minimum allocations for electric vehicle charging infrastructure, which applies to newly built buildings and certain existing buildings.
- In June 2020, the Long-term Strategy for Energy Renovation in the Building Sector in Spain (ERESEE 2020) was published, thus 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 draw up a long-term strategy to support the renovation of its national stock of residential and non-residential buildings, both public and private, by transforming them 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 housing renovation those set by the PNIEC for the period 2021-2030.
- Royal Decree 736/2020, of 4 August, regulating the accounting of individual consumption in thermal installations in buildings. The measure allows each building user to know and receive information about its energy consumption for centralised heating or cooling and to pay only the amount he actually consumes, thus promoting energy savings.
- Royal Decree 178/2021 of 23 March 2021 amending the Regulation on Thermal Buildings Installations (RITE) of 2007, bringing the Regulation into line with European standards on eco-design and energy labelling (ErP and ELD).
- Royal Decree 390/2021 of 1 June 2021 approving the basic procedure for the certification of the energy performance of buildings, repealing the previous Royal Decree, and requiring a visit to the building or dwelling, which will allow the collection of data, tests and checks necessary for the correct completion of the energy performance certificate. In addition, the maximum period of validity 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 the activity of renovation of buildings 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 scheme for carrying out such works, as well as for applying for aid and financing for its development.

In the short term, studies must be launched to propose the amendment of Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency, so that cumulative savings resulting from energy efficiency measures can be taken into account, and not only savings made during one year, regardless of the life of the investment, as is the case.

Finally, the legislative measures proposed by the Autonomous Communities within the scope of their powers in housing or other matters will also be relevant.

**Public aid programmes:** non-repayable aid and financing programmes for existing residential buildings that are renovated in energy, improving the 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. These programmes include programmes ('Renove Plans') aimed at actions or interventions that do not affect the building as a whole, but rather individual dwellings of private owners for the renovation of fences (windows and joinery), separate roofs and façades, boilers and heaters, among others.

In any case, public support will be linked to a minimum leap in the energy rating or to a minimum saving of 30 % in terms of primary energy, and the rate of aid will be increased if social criteria are met, to achieving high energy rating levels or improvements of 2 or more letters and to carrying out

comprehensive actions that act simultaneously on the building envelope and on the thermal installations of the building.

Until the revision of the NECP, programmes for non-repayable aid and financing for existing residential buildings that are renovated in energy, improving the energy rating, have been approved.

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 %.

Component 2, out of the total budget of EUR 6.820 million, plans to dedicate a budget of EUR 4.000 million to the energy renovation of housing in the period 2020-2023, through 6 reforms and 6 investments. The aid programmes devoted in whole or in part to the energy renovation of residential or residential buildings are included in the following investments:

1. C02.I01: Rehabilitation programme for economic and social recovery in residential settings, with a budget of EUR 3.420 million.
2. C02.I03: Energy renovation programme for buildings (PREE), with a budget of EUR 300 million increased to EUR 402 million.
3. C02.I04: Regeneration and demographic challenge programme (PREE5000 only), with EUR 50 million increased to EUR 200 million of budget.

The bases for all these aid lines have been designed in line with the National Strategy against Energy Poverty 2019-2024 (see Measure 4.2 of this Plan) and the Just Transition Strategy, both approved in 2019. Interventions in energy-poor households have higher aid intensities.

**Funding programmes:** Creation of financing instruments, through partnership agreements with financial institutions, aimed at the Communities of Owners, to encourage the renovation of their buildings, as they may have difficulties in finding such financing through ordinary channels.

Component 2 "Implementing the Spanish Urban Agenda: Urban regeneration and rehabilitation plan, including reform C02.R06: Improving the financing of renovation measures, which provides for the creation of ICO guarantees to partially cover the risks of loans granted by private financial institutions for renovation of buildings, housing, promoted by the Ministry of Transport, Mobility and Urban Agenda (MITMA), which has already been authorised by the Government. The signing of the agreement between MITMA and ICO for a new EUR 1.100 million guarantee line, as a financing instrument through collaboration agreements with financial institutions to promote the renovation of residential buildings.

**The Energy Saving Certificates System** (CAE, measure 2.23) will enable SNOEE subjects to invest in both replicable and unique energy renovations. However, the need to change the savings accounting framework to work with cumulative rather than annual savings is stressed again, so as to incentivise the real and complete impact of investments, particularly when they are major investments with a long-term impact, as is the case here.

**Training:** the training of the actors involved in the energy renovation process (designers, optional management and agents responsible for 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 started to be carried out, through the development of tools such as the IDAE online training platform,<sup>87</sup> for the training of citizens in important areas such as energy savings at the workplace, 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 promoted, maintaining a web platform aimed at companies and operators in the sector that includes good practices in the field of energy renovation. A page webis also created from 2022 onwards<sup>88</sup> to provide information on the actual labels of the housing certificates and on the estimated labels of dwellings that do not yet have the certificate. Information is also provided on where the energy performance certificate for the dwelling can be obtained in the relevant Autonomous Community and on those in place to carry out energy renovation of the dwelling. Guides have been drawn up on aspects related to energy renovation, such as the two practical guidelines for

<sup>87</sup>[www.aprendecomoahorrarenergia.es](http://www.aprendecomoahorrarenergia.es)

<sup>88</sup>[www.edificioeficientes.gob.es](http://www.edificioeficientes.gob.es)

the management of aid for the energy renovation of buildings drawn up by the Spanish High Council of Architects (CSCAE) in collaboration with IDAE, as well as the Technical Guide on the accounting of individual heating consumption in thermal installations in buildings (RD 736/2020) published by IDAE. The observatories such as Observatory 2030 of the CSCAE and the City Observatory have also been strengthened.

**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 to promote energy renovation among citizens and sectoral actors, such as the media campaign called ‘Derrochólicos’ to raise public awareness of the need to save energy promoted by the Ministry for the Ecological Transition and the Demographic Challenge, the social media campaign on ‘energy saving councils’ and the information 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 Transport, Mobility and the Urban Agenda entitled ‘Home sweet home’, in which the subsidy lines for the energy renovation of dwellings are disseminated.

The Council of Ministers of 11 October 2022 approved the **More Energy Security (+ SE) Plan** to strengthen the protection of citizens from the price increase caused by the war in Ukraine, in the framework of the European commitment to energy savings. One of the measures included in this Plan is to include additional information in bills to provide consumers with additional tools for making decisions on savings. Thus, the light and gas bills of consumers with a power of less than 15 kW and a consumption of less than 50.000 kWh per year, respectively, shall include a comparison of consumption with similar customers under the same postal code. They will also include advice on how to consume in a smart and efficient way.

**g) Specific measures or individual actions on energy poverty**

This measure will be developed in line with the National Strategy against Energy Poverty 2019-2024 (see Measure 4.2 of this Plan) and the Just Transition Strategy, both approved in 2019. Interventions in households in energy poverty shall have higher aid intensities.

**h) Financial needs and public support**

The total estimated public support for the development of this measure in the period 2021-2030 amounts to **EUR 3.067 million, which will**, to a large extent, come from European structural and investment funds corresponding to the new financial framework, and which will make it possible to mobilise an investment volume of **EUR 23.772 million over the whole period**.

## 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 household appliance stock or, more generally, the energy-consuming household equipment stock.

One of the EU's most effective tools to promote energy efficiency in energy-intensive equipment is ecodesign and energy labelling rules, contributing around half of the 2020 energy savings target. In addition, ecodesign rules have started to address the most efficient and sustainable use of materials in product design and processes taking place throughout the value chain, involving: reduction of demand for material resources, improvement of energy efficiency, easy reuse and recycling, economics 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 be made more energy efficient and, therefore, the need to rescale labels. Energy labels for key consumer products such as light refrigerators, washing machines, televisions and light sources have been rescaled as of 1 March 2021. 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 of the household appliance stock, is renewed at the end of its lifetime, this is considered to be an appropriate moment to encourage purchasers to replace them with others with the best energy efficiency class among those placed on the market.

The new and additional savings that will result from this measure (in addition to those resulting from the application of the future Ecodesign Framework Regulation, which will replace the current Directive 2009/125/EC, and Regulation (EU) 2017/1369 on Energy Labelling) will be those associated with bringing forward the decision to replace the equipment (compared to the time when renovation would have taken place in accordance with the natural rates of renewal of the fleet) and the fact that the measure will encourage the purchase of equipment with higher energy yields than the average of those marketed in each year of the period of application of this Plan.

Priority will be given to appliances whose energy consumption is higher in household consumption, such as refrigerators, refrigerator-freezers and freezers, washing machines, dishwashers, ovens and kitchens.

With an estimated national fleet of **76 million appliances** (refrigerators, freezers, washing machines, dishwashers and televisions), the measure aims to achieve savings as a result of the improvement in the energy class (with reference to energy labelling) compared to the market reference class at the time of substitution.

Considering that 6,6 million new white appliances are sold annually, the proposed target is the penetration of 2.443.000 appliances/year of the highest energy efficiency class.

We would also like to highlight the need for market surveillance and product compliance, Regulation 2019/1020, in order to ensure compliance with the minimum requirements for eco-design and energy labelling and thus guarantee the credibility of the system. Thus, in 2022, a general national strategic framework for the surveillance of the market in non-food products (MENVIME) was approved, with a sectoral plan relating to market surveillance of energy labelling.

### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The aim of the measure is to achieve a **cumulative final energy saving of 1.745 ktoe** in the period 2021-2030.

### c) Bodies 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 energy efficiency measures and actions that respect Spain's distribution of competences.

Public administrations will work together to implement this measure with consumer and user associations, who will have to play an active role by signing voluntary agreements.

**d) Sectors addressed**

This measure is aimed at the household sector.

**e) Eligible actions**

The actions proposed in this Plan are mainly communication actions to promote knowledge and 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 household equipment. These communication actions will be part of an overall permanent strategy aimed at citizens as the main actor.

**f) Mechanisms for action**

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Energy Saving Certificates (CAE) system** will enable the subjects subject to the SNOEE to be invested as efficiently as possible in replicable actions for the purchase of energy consumption elements in the residential sector with a label that is very demanding from the point of view of energy consumption, within the framework of the Energy Labelling Regulation.

**Market surveillance. Sectoral Plan for Market Surveillance of Energy Labelling**, to be carried out in coordination with the Autonomous Communities, which are competent in this area.

**Legislative measures: The approval of Regulation (EU) 2017/1369 was published in the Official Journal of the European Union on 28 July 2017.** In this context, the European Commission and the Member States decide to revise the requirements for energy-labelled products and to re-scale the energy classes so that there is a uniform A to 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. Therefore, the new label means:

1. A common A to G scale for all rescaled 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:
  - Domestic refrigerators and freezers
  - Wine storage refrigerators
  - Washing machines
  - Washer-dryers
  - Dishwashers
  - Televisions and electronic displays
  - Light sources

For other product groups such as conditioned aires, dryers, stoves, boilers, etc., the new labels will be replaced once the new or revised EU regulations enter into force. The introduction of the label for these product groups is expected to take place from 2022 onwards.
2. The label is linked to the European Product Registry for EU Energy Labelling (EPREL) by means of 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.
3. In the first months of the introduction of the new label, few “A” class devices are expected to be available on the market. This aims to keep space for more innovative and efficient products to be developed in the future.
4. Products labelled as A + + + correspond (approximately) to the new class B or C.

**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 winning social networks, blogs, expert and sectoral forums) with targeted publicity support, it is proposed to launch a specific line of action to help boost the **purchase of more efficient household appliances**, with energy savings and environmental commitment being particularly valued in communication.

This awareness-raising campaign will run continuously over time and will intensify during peak purchasing periods. It will be coordinated with associations of manufacturers, distributors and retailers, with support from the IDAE to run their own communication initiatives.

In addition, communication actions focusing on the **efficient and responsible use of the equipment will be developed.**

In order to disseminate and explain the changes brought about by Regulation (EU) 2017/1369, a communication campaign was designed and implemented in collaboration with ECODES whose messages can be seen in this area or, in addition to updating the specific section dedicated to this sector by IDAE<sup>90</sup>.

In addition, specific information and communication campaigns have been carried out with a view to promoting, among other things, the efficient use of household appliances among citizens, such as those already mentioned in Measure 2.8 (media campaign called 'Derrochólicos'<sup>91</sup> of the Ministry for the Ecological Transition and the Demographic Challenge, the social media campaign on 'energy saving councils' and the information 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 Transport, Mobility and Urban Agenda entitled 'Home sweet home home'<sup>92</sup>).

**Public aid programmes:** In the period 2020-2022, the following Renove plans for domestic appliances have been published by the Autonomous Communities to promote the best energy labelling equipment. As can be seen from the following collection list at the time of the review, no valid renove plan was found:

- Renove Plan for Household Appliances in Aragon in 2020 with a budget of EUR 1,4 million. The higher the energy category of the household appliance to be purchased, the higher the aid. The aid can be between EUR 150 and EUR 85 depending on the type of household appliance.
- Renove Plan for Household Appliances in Extremadura in 2020 with a budget of EUR 1,5 million. The aid is intended for the purchase of dishwashers, washing machines and refrigerators. In case the appliance is changed to one with the highest energy efficiency, the aid could be up to EUR 150. For all induction ovens and enzymes the aid amounted to EUR 100 per unit.
- Plan renove for domestic appliances in Madrid in 2021, with a budget of EUR 1,8 million, in force from 10 December 2020 to 31 December 2021. As regards the amount of aid, the aid will never exceed 25 % of the value of the household appliance. Up to EUR 70 in washing machines, EUR 120 in refrigerators and EUR 110 in dishwashers.
- Renove plan for household appliances in La Rioja in 2021 with a budget of EUR 350.000, in force from November to December 2021.
- Plan renove household appliances and windows in the Basque Country in 2020 with a budget of EUR 2,5 million, with the aim of replacing approximately 25.000 household appliances with other appliances with high energy efficiency (Class A + + + and A + + and for ovens Class A +). The maximum aid per beneficiary and household appliance will not exceed 25 % of the final sales price (PVP) and will vary between EUR 100 and EUR 130 depending on the type of household appliance and energy class.
- Renove Plan for Household Appliances in Galicia for 2022 with a budget of EUR 2 million, in force from March to June 2022. The final amount will depend on the type of household

---

<sup>89</sup><https://youtu.be/CSXSAPBmX9A>

<sup>90</sup><https://www.idae.es/ahorra-energia/reglamento-para-el-etiquetado-energetico>

<sup>91</sup><https://www.derrocholicos.es/>

<sup>92</sup><https://www.mitma.gob.es/el-ministerio/campanas-de-publicidad-acciones-de-comunicacion-y-otros-events/hogar-dulce-household>

appliance to be changed, ranging from EUR 100 to EUR 450. A maximum of two household appliances may be changed by each individual. Household appliances could be refrigerators, washing machines, dryers, dishwashers, etc.

**g) Financial needs and public support**

Public financial support will be earmarked for communication and coordination campaigns and support for the implementation of the Sectoral Market Surveillance Plan for Energy Labelling, in the National Strategy for the Surveillance of Non-Food Products (MENVIME). These actions can be considered within the framework of the SNOEE. For their part, the Autonomous Communities will dedicate the corresponding effort to the exercise of their competence in the area of market surveillance.

## Measure 2.10. District heating and cooling networks

### a) Description

This measure aims to facilitate the penetration of **renewable or waste energy sources, efficient and flexible**, in the air-conditioning of residential buildings and in other industrial heat and cold applications within the same temperature range.

The revision of the Renewable Energy Directive stipulates that Member States must take the necessary measures to increase the share of renewable energy in the consumption of heat and cold by 1.3 % per year, starting from the value reached in 2020. Furthermore, the share of heating and cooling networks using renewable energy in the supply of heating and cooling is much less than the 2 % laid down 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 in the residential sector at the end of 2021. This calls for measures to promote district heating and cooling networks using renewable energy.

A significant potential for newly deployed heat and cold networks in Spain has been identified. Therefore, this Plan considers specific measures, both regulatory and financial support, to ensure that heat and cold networks using renewable energy sources have a more significant share in 2030.

For the time being, this technology has a very testimonial presence in Spain. According to the 2022 Census of Heat and Cool Networks developed by ADHAC with the support of IDAE, the heat demand met in the residential sector with these systems is lower than 0.5 GWh (0.18 GWh for cold applications), which contrasts with data from neighbouring countries such as Italy (9 073 GWh) or France (25.078 GWh). It is therefore worth considering this technology with ambition, noting the following points:

- While heat and cold networks are a cost-effective solution in the long term, they require significant **investment** and, although heating needs, measured in degrees days, can be in the order of half of others in northern Europe, urban population density is of the order of double in many Spanish cities. This is compounded by the growing need for cold weather in residential buildings.
- Furthermore, it will be necessary to analyse the **technical challenges** of introducing heat 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 cheaper, but also for areas that have already been built, where population density is often higher, and where current heating systems are often individual boilers. It is therefore necessary to consider how best to solve the necessary interconnection between the potential heat and cold network and existing residential buildings which often **lack easily connected infrastructure**<sup>93</sup>. Moreover, the introduction of **cold for residential buildings** from these networks is still rare, even in the rest of Europe. It is necessary to study and analyse how to manage, both from the production point of view, using e.g. geothermal energy with large heat pumps, as well as in the urban distribution and connection with the above-mentioned existing neighbourhood buildings.

It is also necessary to analyse from the perspective of the fisonomy of Spanish cities, on many occasions, **the lack of consistency of alternatives to decarbonise the air conditioning of buildings:**

- **In the summer, individual heat pumps** create a heat island effect that only stretches further the electricity demand needed to maintain comfort conditions, at the cost of worsening energy efficiency and increasing energy consumption. Furthermore, in both cold and heat mode, myriad heat pumps installed in each apartment mean uncontrollable use, less maintenance and more obsolescence (both leading to lower efficiency and higher energy consumption), without the associated sound and visual impact of the external units of individual heat pumps.
- The replacement of natural gas by **biogas**, although a partial alternative, does not seem to have sufficient potential to replace at all the consumption of the current stock of combustion boilers in the residential sector.
- Other technologies such as **solar thermal** or **biomass** have growth potential, but not to adequately feed the needs for air conditioning in a decarbonised way. However, all these clean technologies can be integrated into heat and cold networks, contributing flexibly, clean and efficient to meeting the thermal needs of large urban areas.

<sup>93</sup>This lack of adequate connection between dwellings should not be an insurmountable problem, given the relatively similar previous experiences, such as, for example, the numerous campaigns to equip elevators to buildings that did not have them and which involved their installation in thousands of Spanish buildings.



- **Electric boilers** have a lower efficiency than heat pumps, suggest excessive electricity consumption, with peaks in consumption where solar energy will deliver less production, and do not solve the growing need for cold refurbishment of buildings during the summer.

Finally, it should be stressed 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 current renewable contribution of heat networks in countries where heat is usual and modernised with 4th and 5th generation networks is already 60 % in Denmark, 82 % in Sweden, 70 % in Lithuania or 56 % in Francia<sup>94</sup>.

#### **b) Expected savings**

The expected savings are calculated as the contribution of energy from solar radiation, from geothermal, hydrothermal or aerothermal sources, or from other renewable or residual sources.

This measure is expected to achieve cumulative estimated savings of **2.922,1** ktoe over the period 2021-2030. However, CO<sub>2</sub> emission savings are much<sup>more</sup> significant by replacing fossil fuels with renewables.

In addition to these savings, the ability to integrate the contribution from residual heat, the use of biomass or waste (via methanisation or the most environmentally appropriate alternative), and the renewable fraction of the electrical fraction driving large heat pumps or other equipment to power the grid should be reemphasised.

Furthermore, in 2022 IDAE published a calo map<sup>95</sup> which is an extremely useful tool to start studying in more detail the technical and economic potentials of each area. However, at present and in the absence of such studies, it is difficult to estimate the potential precisely.

If the energy consumption of residential buildings in Spain reaches almost 14 % of final energy consumption and assumes a scenario in which between 25 % and 50 % of long-term demand (horizon 2050) would be supplied with heat and cold networks; and taking into account, according to the drafts of the new energy efficiency directive, a clean energy supply to these networks, savings of between 3 % and 7 % of national final energy consumption can be estimated.

#### **c) Bodies responsible**

The technical and economic construction and management of heat networks is usually carried out at municipal level, either by public, private, mixed or energy communities. In any case, both the management problem 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 respect Spain's distribution of competences.

Public administrations will work together to implement this measure with municipalities and consumer and user associations, which can play an active role by signing voluntary agreements.

In addition, MITECO will explore the establishment of a common framework to promote decarbonised and cost-efficient energy supply, considering distribution system management, dispatching system to minimise the cost and environmental impact of the contribution of different energy sources to the grids, grid connection permits and rights, access to third parties to interconnect productive elements to the grids, etc.

For its part, MITMA is already taking into account the heating and cooling networks for updating the ERESEE (measure 7: Promotion of heat and cold networks), which may also require legislative developments relating to urban planning, the declaration of public interest and other matters within its remit.

#### **d) Sectors addressed**

These measures are targeted at all liveable buildings in the residential sector in areas with higher air conditioning needs and in densely populated areas, and also at heating and cooling requirements in the industrial sector that are in approximately the same temperature range as air conditioning.

<sup>94</sup> [JRC, Integrating renewable and waste heat and cold sources into district heating and cooling systems, 2021](#)

<sup>95</sup> <https://mapadecolor.idae.es/>

### e) Eligible actions

Eligible actions will be those that facilitate the deployment of district heating and cooling networks, such as:

- R & D & I projects on the development of 100 % more efficient heat and cold networks with renewable energy sources.
- Feasibility studies for the deployment of renewable heat and cold networks.
- Project, implementation and implementation of renewable heat and cold networks.

### f) Mechanisms for action

The policy mechanisms that will enable progress to be made on this measure will be the following:

**Legislative measures:** The relevant ministerial departments (MITECO, MITMA) 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 with the aim of reducing administrative constraints, harmonising requirements at national level and facilitating investment.
- Obligation to carry out prior feasibility studies and develop obligations to implement municipal plans for the clean and efficient supply of energy to buildings that consider, inter alia, options for heating and cooling networks, in accordance with Article 23 of the new Energy Efficiency<sup>96</sup>Directive.
- Declaration of public utility of land use for the installation of cold and heat production plants, storage, for the purposes of possible expropriation, as well as the right to impose a compulsory easement of pipelines, both in the public and private land.
- Obligation for urban development plans to provide for and permit the location of infrastructure on the subsoil of public roads, free spaces or green areas. Regime of the corresponding administrative permits.
- Forecasts of the investment plan.
- Amendment of Mining Law 22/1973 (currently under revision) to promote research, exploration and exploitation of geothermal resources, where, for example, the application of mining grids for such activities could be modified.
- Setting of infrastructure design and safety conditions.

**Public aid programmes: non-repayable aid and financing** programmes for high-efficiency heat and cold networks (in line with the definitions under consideration for the new energy efficiency directive).

#### Information and communication:

- Mechanisms to improve the information available to comply with 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 complies with the definition of 'efficient district heating and cooling system' in the Energy Efficiency Directive (at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of these types of energy and heat).
- Information channel for final consumers on energy efficiency and the share of renewable energy in the heat networks they are connected to. This measure may be implemented by amending the legislation on existing thermal installations (RITE) and the regulation on the energy certification of buildings.
- Increases in heat map information to help identify new heat and cold 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 heat or cold networks.

### g) Financial needs and public support

---

<sup>96</sup>According to the draft text resulting from the political trilogue phase on 9 March 2023 for the amendment of Directive 2012/27/EU of 25 October 2012 on energy efficiency and Directive (EU) 2018/2002 of 11 December 2018.

Public financial support for the development of this measure in the period 2021-2030 will be used both for non-repayable grants and for investments in new projects.

**(I) Preventive, corrective and compensatory measures for potential negative effects**

The policy measures provided for in the NECP for the transformation of the industrial and residential sector related to the deployment of district cold and heat networks will lead to an increase in the rate of renovation of equipment and of construction and demolition waste.

The ESAE of the NECP states that mitigating measures will be implemented in the following areas: construction and demolition waste management, waste management of electrical and electronic equipment, hazardous waste management and adaptation of emission control systems. It also provides for measures involved in the replacement of equipment that may contain fluorinated gases.

## Tertiary

### 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 stated in Measure 2.6 of this Plan, concerning the improvement of the energy efficiency of existing buildings in the residential sector, energy performance certification (Royal Decree 390/2021 of 1 June) is a very valuable tool for developers of renovation actions when making new investments in existing buildings.

The measure comprises different mechanisms:

- 1) Revision of energy performance requirements in tertiary buildings, which include new energy efficiency obligations or revisions of existing ones established by legislation, such as those included in Royal Decree-Law 14/2022 of 1 August, relating to temperature limits in the air-conditioning of buildings, closing doors or lighting.
- 2) Extension of the obligation to renovate public buildings of the General State Administration to the regional and local authorities (laid down in Article 6 of the agreement amending the Energy Efficiency Directive reached in March 2023). This extension of the mandate to all regional and local authorities would ensure that the public sector plays a proactive and responsible role and would result in savings on the energy bills of the public administrations.
- 3) Energy renovation of buildings through public support and financing programmes. The aid programmes under Component 2 of the PRTR, such as the Programme of Aid for Energy Renovation Actions in Existing Buildings (PREE), the Energy Renovation Programme for existing buildings in municipalities facing demographic challenges (PREE 5000) or the Programme to Promote the Renovation of Public Buildings (PIREP), are the reference for this type of public support for the renovation of buildings in the tertiary sector.
- 4) Energy saving and efficiency plans, such as the Plan of energy saving and efficiency measures 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 interim period

The measure aims at achieving 3.361ktoe of cumulative final energy savings over the period 2021-2030.

#### c) Bodies 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 respect Spain's distribution of competences.

#### d) Sectors addressed

This measure is aimed at existing buildings for tertiary use, publicly owned by all administrations and privately owned. Aid programmes shall include owners or owners of existing buildings, whether natural or legal persons, as beneficiaries. Where the beneficiaries of the aid are legal persons of a private nature, the programmes shall comply with State aid rules.

#### e) Eligible actions

The eligible actions for the renovation of buildings will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption by improving those services with a higher weight in the energy consumption of buildings, such as heating, cooling and domestic hot water production:

- **Thermal envelope:** action shall 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 joinery, glass and sunscreen.

- **Thermal installations:** action will be taken on thermal installations for heating, air conditioning, domestic hot water production and ventilation, regulated by the RITE. The measure provides for the incorporation of renewable energy sources to cover demand in accordance with the renewable final energy consumption targets considered in this Plan.
- **Lighting installations:** action shall be taken on the internal lighting installations of buildings, in accordance with the required energy efficiency values according to the use of each zone; implementing systems for regulating and controlling ignition depending on the activity in each area of the building, and adapting the level of lighting to the supply of natural light.

#### f) Mechanisms for action

The policy mechanisms that will enable the expected savings targets to be achieved are as follows:

**Taxation:** Law 10/2022 on urgent measures to boost building renovation activities has been published in the context of the PRTR, amending Law 35/2006 of 28 November 1992 on Personal Income Tax (PIT), which approves:

- Deductions from personal income tax, applicable to amounts invested in renovation works.
- Aid granted under various energy renovation programmes for buildings under the PRTR will not be included in the tax base for personal income tax, specifically:
  - *Royal Decree 737/2020 (PREE) of 4 August.* Aid programme for energy renovation measures in existing buildings.
    - *Royal Decree 477/2021, of 29 June.* Various incentive schemes linked to self-consumption and storage, using renewable energy sources, and the introduction of renewable energy systems in the residential sector.
  - *Royal Decree 691/2021 (PREE 5.000) of 3 August.* Aid programme for energy renovation in existing buildings in municipalities facing demographic challenges.
    - *Royal Decree 853/2021, of 5 October,* on various support programmes for residential rehabilitation and social housing.

**Legislative measures:** extension of the mandate resulting from Article 6 of the agreed text amending 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 promote energy efficiency measures in the tertiary sector:

- Royal Decree-Law 14/2022 introducing extraordinary measures for saving, energy efficiency and reducing energy dependency, which temporarily amends paragraph 2 of the RITE I.3.8.1 for certain non-residential buildings until 1/11/2023, limiting the heating temperature to maximum 19 °C and cooling temperature to a minimum of 27 °C. In addition, air-conditioned rooms that have access to the street must have a door that is automatically closed and the section on energy efficiency inspections of generating equipment is also amended.
- The Council of Ministers of 24 May 2022 approved a Plan of Energy Saving and Efficiency Measures, addressed to the General State Administration and State-owned public sector entities. This plan, promoted by 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 save energy, while ensuring the full provision of services and care to citizens. The energy saving measures plan is one of the commitments set out in the National Plan to respond to the economic and social consequences of the war in Ukraine, approved by the Council of Ministers on 29 March. This war has brought fuel prices in Europe to historical levels and has highlighted the risks of high energy dependency.

**Public aid programmes:** non-repayable aid and financing programmes for buildings in the tertiary sector that are rehabilitated in energy terms, improving the energy rating. In this area, under the PRTR and specifically Component 2 'Implementation of the Spanish Urban Agenda: Urban regeneration and renovation plan', specific programmes have already been developed in the tertiary sector, with the energy objective of reducing the primary energy consumption of the building by at least 30 %. The aid programmes partially dedicated to the energy renovation of buildings in the tertiary sector, with an estimated budget of EUR 1.150 million, are as follows:

1. C02.I01: Rehabilitation programme for economic and social recovery in residential settings, with

a budget of EUR 3.420 million, which includes 2 programmes whose budget is mainly dedicated to the energy renovation of buildings in the tertiary sector owned by the local and Autonomous Communities:

- a. Local PIERP aid programme with EUR 600 million.
  - b. The PIERP programme in the Autonomous Communities with EUR 480 million.
2. CO2.I03: Energy renovation programme for buildings (PREE), with a budget of EUR 300 million increased to EUR 402 million.
  3. CO2.I04: Regeneration and Demographic Challenge Programme (PREE5000), with EUR 50 million increased to EUR 200 million of budget.
  4. CO2.I04: Regeneration and Demographic Challenge Programme (DUS 5000), with EUR 75 million increased to EUR 675 million of budget. It is estimated that 10 % of this budget (EUR 68 million) will be earmarked for the energy renovation of buildings in the local tertiary sector.

In addition, the PRTR in 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 1070,7 million, of which EUR 664,5 million is dedicated to the energy renovation of buildings in the tertiary sector owned by the AGE.

Furthermore, the PRTR in its Component 14 'Plan for the modernisation and competitiveness of the tourism sector', with a budget of EUR 3.400 million, includes 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 have already been launched among the Autonomous Communities by agreement of the Sectoral Tourism Conference 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.

In addition, a new aid line has yet to be published in 2023 following a public hearing, the objective of which is the energy renovation of buildings in the tertiary sector (PREE Terciario), with an amount of EUR 100 million, financed by the FNEE 2022.

**Energy Saving Certificates (CAE) system** will enable those subject to the SNOEE to invest as efficiently as possible in actions, both replicable and unique, related to energy efficiency in this sector.

**Training:** training for the actors involved in the energy renovation process (designers, optional management, agents responsible for external control of energy regulations, as well as managers and energy 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 platform have been developed<sup>97</sup> for the training of energy managers in public buildings, which is considered essential for the smooth running of public 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 promoted, maintaining a platform for companies and operators in the sector on the IDAE website with databases and best practices in the field of energy renovation. A page webis also created from 2022 onwards<sup>98</sup> to provide information on the actual labels of building certificates and estimated labels for buildings that do not yet have the certificate. Information is also provided on where and how the energy performance certificate for the building can be obtained in the corresponding Autonomous Community and about the existing aid to carry out an energy renovation of the building.

**Communication:** specific information and communication campaigns will be carried out. In particular, an information and communication campaign has already been developed for public administrations' buildings, including energy saving, renewable energy use and sustainable mobility messages, with a view to their dissemination and use in all public administrations.

#### g) 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, to a large extent, come from European structural and investment funds under the new financial framework, **mobilising around EUR 4.420 billion of investment**.

<sup>97</sup>[www.aprendecomoahorrarenergia.es](http://www.aprendecomoahorrarenergia.es)

<sup>98</sup>[goods.gob.es](http://goods.gob.es)

## h) Preventive, corrective and compensatory measures for potential negative effects

The policy measures for the transformation of the service sector provided for in the NECP will lead to an increase in the rate of renovation of construction and demolition waste. This increase will require ensuring compliance with the instruments for waste management and control, including the recovery of waste and the promotion of recycling.

It is therefore particularly important to train the various actors involved in this transformation (manufacturers, installers, construction companies, etc.) through specific instruments (guides, courses, technical advice), the general guidelines for which will be laid down at national level.

### Measure 2.12. District heat and cooling networks in the tertiary sector

#### a) Description

This measure aims to facilitate the penetration of **renewable or waste energy sources, efficient and flexible**, in the air conditioning of tertiary buildings and in other industrial heat and cold applications within the same temperature range.

The revision of the Renewable Energy Directive stipulates that Member States must take the necessary measures to increase the share of renewable energy in the consumption of heat and cold by 1.3 % per year, starting from the value reached in 2020. Moreover, the share of heating and cooling networks using renewable energy in the supply of heating and cooling is much less than the 2 % laid down in Article 24 (10) (a) of Directive 2018/2001 on the promotion of the use of energy from renewable sources, with the tertiary sector accounting for some 442 MW installed at the end of 2021. This calls for measures to promote district heating and cooling networks using renewable energy.

A significant potential for newly deployed heat and cold networks in Spain has been identified. Therefore, this Plan considers specific measures, both regulatory and financial support, to ensure that heat and cold networks using renewable energy sources have a more significant share in 2030.

For the time being, this technology has a very testimonial presence in Spain. According to the 2022 Census of Heat and Cool Networks developed by ADHAC with the support of IDAE, the heat demand met by these systems in the tertiary sector is lower than 0.6 GWh (0.23 GWh for cold applications), which contrasts with data from neighbouring countries such as Italy (9 073 GWh) or France (25.078 GWh). It is therefore worth considering this technology with ambition, noting the following points:

- Heat and cold networks, while being 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 for residential buildings.
- Furthermore, it will be necessary to analyse the **technical challenges** of introducing heat networks in Spain. Firstly, heating and cooling networks are not only an option for new urban developments, where planning and initial construction are simpler and cheaper, but also for areas that have already been built, where current heating systems are often individual boilers. It is therefore necessary to consider how best to solve the necessary interconnection between the potential heat and cold network and existing tertiary buildings which often **lack easily connectable infrastructure**. Moreover, as in residential buildings, the introduction of **cold for tertiary buildings** from these networks is still rare, even in the rest of Europe. It is necessary to study and analyse how to manage, both from the production point of view, using e.g. geothermal energy with large heat pumps, as well as in the urban distribution and connection with the above-mentioned existing neighbourhood buildings.

It is also necessary to analyse from the perspective of the fisonomy of Spanish cities, on many occasions, **the lack of consistency of alternatives to decarbonise the air conditioning of buildings:**

- In **the summer, individual heat pumps** create a heat island effect that only stretches further the electricity demand needed to maintain comfort conditions, at the cost of worsening energy efficiency and increasing energy consumption. Furthermore, in both cold and heat mode, myriad heat pumps installed in each building or premises in the tertiary sector mean uncontrollable use, less maintenance and more obsolescence (both leading to lower efficiency and higher energy consumption), without the associated sound and visual impact of the external units of individual heat pumps.
- The replacement of natural gas by **biogas**, although a partial alternative, does not seem to have sufficient potential to replace at all the consumption of the current fleet of combustion boilers in the tertiary sector.
- Other technologies such as **solar thermal** or **biomass** have growth potential, but not to

adequately feed the climate needs of the tertiary sector in a decarbonised way. However, all these clean technologies can be integrated into heat and cold networks, contributing flexibly, clean and efficient to meeting the thermal needs of large building areas or premises in the tertiary sector.

- **Electric boilers** have a lower efficiency than heat pumps, suggest excessive electricity consumption, with peaks in consumption where solar energy will deliver less production, and do not solve the growing need for cold refurbishment of buildings during the summer.

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 reference that the current renewable contribution of heat networks in countries where heat is usual and modernised with 4th and 5th generation networks is already 60 % in Denmark, 82 % in Sweden, 70 % in Lithuania or 56 % in Francia<sup>99</sup>.

#### **b) Expected savings**

The expected savings are calculated as the contribution of energy from solar radiation, from geothermal, hydrothermal or aerothermal sources, or from other renewable or residual sources.

This measure is expected to achieve cumulative estimated savings of **1.949,7** ktOE over the period 2021-2030. However, CO<sub>2</sub> emission savings are much more significant by replacing fossil fuels with renewables.

In addition to these savings, the ability to integrate the contribution from residual heat, the use of biomass or waste (via methanisation or the most environmentally appropriate alternative), and the renewable fraction of the electrical fraction driving large heat pumps or other equipment to power the grid should be reemphasised.

Furthermore, in 2022 IDAE published a calor map<sup>100</sup> which is an extremely useful tool to start studying in more detail the technical and economic potentials of each area. However, at present and in the absence of such studies, it is difficult to estimate the potential precisely.

If the energy consumption of tertiary buildings in Spain reaches almost 17 % of final energy consumption and assumes a scenario in which between 25 % and 50 % of long-term demand (horizon 2050) would be supplied with heat and cold networks; and taking into account, according to the drafts of the new energy efficiency directive, a clean energy supply to these networks, savings of between 4 % and 8 % of national final energy consumption can be estimated.

#### **c) Bodies responsible**

The technical and economic construction and management of heat networks is usually carried out at municipal level, either by public, private, mixed or energy communities. In any case, both the management problem 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 respect Spain's distribution of competences.

Public administrations will work together to implement this measure with municipalities and consumer and user associations, which can play an active role by signing voluntary agreements.

In addition, MITECO will explore the establishment of a common framework to promote decarbonised and cost-efficient energy supply, considering distribution system management, dispatching system to minimise the cost and environmental impact of the contribution of different energy sources to the grids, grid connection permits and rights, access to third parties to interconnect productive elements to the grids, etc.

For its part, MITMA is already taking into account the heating and cooling networks for updating the ERESEE (measure 7: Promotion of heat and cold networks), which may also require legislative developments relating to urban planning, the declaration of public interest and other matters within its remit.

<sup>99</sup> [JRC, Integrating renewable and waste heat and cold sources into district heating and cooling systems, 2021](#)

<sup>100</sup> <https://mapadecalor.idae.es/>



**d) Sectors addressed**

These measures are targeted at all buildings in the tertiary sector that can be inhabited in areas with higher air conditioning needs and in densely populated areas, and also at heating and cooling requirements in the industrial sector that are in approximately the same temperature range as air conditioning.

**e) Eligible actions**

Eligible actions will be those that facilitate the deployment of district heating and cooling networks, such as:

- R & D & I projects on the development of 100 % more efficient heat and cold networks with renewable energy sources.
- Feasibility studies for the deployment of renewable heat and cold networks.
- Project, implementation and implementation of renewable heat and cold networks.

**f) Mechanisms for action**

The policy mechanisms that will enable progress to be made on this measure will be the following:

**Legislative measures:** The relevant ministerial departments (MITECO, MITMA) 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 with the aim of reducing administrative constraints, harmonising requirements at national level and facilitating investment.
- Obligation to carry out prior feasibility studies and develop obligations to implement municipal plans for the clean and efficient supply of energy to buildings that consider, inter alia, options for heating and cooling networks, in accordance with Article 23 of the new Energy Efficiency<sup>101</sup> Directive.
- Declaration of public utility of land use for the installation of cold and heat production plants, storage, for the purposes of possible expropriation, as well as the right to impose a compulsory easement of pipelines, both in the public and private land.
- Obligation for urban development plans to provide for and permit the location of infrastructure on the subsoil of public roads, free spaces or green areas. Regime of the corresponding administrative permits.
- Forecasts of the investment plan.
- Amendment of Mining Law 22/1973 (currently under revision) to promote research, exploration and exploitation of geothermal resources, where, for example, the application of mining grids for such activities could be modified.
- Setting of infrastructure design and safety conditions.

**Public aid programmes: non-repayable aid and financing** programmes for high-efficiency heat and cold networks (in line with the definitions under consideration for the new energy efficiency directive).

**Information and communication:**

- Mechanisms to improve the information available to comply with 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 complies with the definition of 'efficient district heating and cooling system' in the Energy Efficiency Directive (at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of these types of energy and heat).
- Information channel for final consumers on energy efficiency and the share of renewable energy in the heat networks they are connected to. This measure may be implemented by amending the legislation on existing thermal installations (RITE) and the regulation on the energy certification of buildings.
- Increases in heat map information to help identify new heat and cold networks in Spain.
- Development of renewable energy communities linked to air-conditioning and cooling networks, including technical training at municipal level.

---

<sup>101</sup>According to the draft text resulting from the political trilogue phase on 9 March 2023 for the amendment of Directive 2012/27/EU of 25 October 2012 on energy efficiency and Directive (EU) 2018/2002 of 11 December 2018.

- Establishment and continuation of forums for discussion and support for the promotion of heat or cold networks.

**g) Financial needs and public support**

Public financial support for the development of this measure in the period 2021-2030 will be used both for non-repayable grants and for investments in new projects.

### Measure 2.13. Energy efficiency in cold generating equipment and large installations for 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:

- 1) Measures for the renovation of major heating and cooling installations, the renovation of cooling equipment and storage and freezing units.
- 2) Measures to improve energy efficiency in publicly-owned infrastructure, principally, in street lighting installations and in installations for the treatment and desalination of water and for making water drinkable.

The first is aimed at reducing consumption in cold storage facilities for the storage and preservation of perishable products in cold stores and logistics facilities for supplies to cities, in large air-conditioning installations for buildings in the tertiary sector (airports, hospitals, shopping centres, offices, etc.), as well as in small installations, furniture and cabinets, in food shops, shops and commercial areas.

In the area of commercial cooling, a deviation from consumption of the order of 10 % in cooling required for food distribution equals 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 for non-compliant 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 and, within that Strategy, the Sector Plan for Energy Labelling were approved, in accordance with Market Surveillance Regulation 1020/2019. During the market surveillance process, which is the responsibility of the Autonomous Communities in Spain, it is checked that the product is in the European EPREL database and that the declaration on 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 2009, which approved the Regulation on energy efficiency in outdoor lighting installations, regulating maximum levels of lighting depending on the activity carried out in the different spaces and the incidence of lighting towards others, as well as increasing the minimum energy efficiency levels for light points.

In addition, it aims to improve the energy efficiency of water treatment, water supply and purification facilities by reforming existing facilities and introducing criteria for efficiency and low energy consumption in the tender documents for water treatment projects.

This second policy measure includes the energy efficiency strategy of the State Road Network approved by MITMA, which aims to save 50 % of its energy consumption by switching lighting from its road infrastructure to more efficient ones and introducing renewable energy sources.

#### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The measure aims to **achieve a cumulative final energy saving of 4.388,7 ktoe** in the period 2021 – 2030.

#### c) Bodies 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 model of co-management and co-financing of energy efficiency measures and actions that respect the distribution of competences in Spain.

#### d) Sectors addressed

The measure is aimed at the tertiary sector, either natural or legal persons owning large refrigeration installations (over 70 kWe) or air conditioning facilities, and those owning small installations, using

furniture and cabinets, in food shops, shops and commercial areas. As regards public infrastructure, the measure is addressed to the local authorities and to the concessionaires for the management of municipal public services.

#### e) Eligible actions

The eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and final energy consumption by improving energy efficiency in:

- **Sub-measure 1.** Cold generation equipment.

Refrigeration generating equipment that improves energy efficiency by incorporating regulation and control systems, recovering heat from condensation or evaporation and others with high energy saving capacities (multi-stage or ability to vary condensation or evaporative temperatures). In the case of refrigerated furniture, the installation of lids or doors and the replacement of lighting systems with other systems with lower energy consumption and less heat dissipation. This sub-measure will have a new aid line in 2023, which has yet to be published following a public hearing, the objective of which is the energy renovation of buildings in the tertiary sector (PREE Texario), with an amount of EUR 100 million, financed by the FNEE 2022.

- **Sub-measure 2.** Market surveillance of compliance with the Energy Labelling Regulation.

Implementation of the Sectoral Plan for Market Surveillance of Energy Labelling in the framework of the National Market Surveillance Strategy, in coordination with the Autonomous Communities competent in this area.

- **Sub-measure 3.** Public and private lighting or water infrastructure.

Replacement and improvement of public lighting systems for lamps by others with greater light efficiency, improvement of the reflective and directional quality of the luminaire and installation of light flow control systems for light points, switched on and off points, allowing them to vary throughout the night according to citizens' needs and adapting lighting levels, in some cases excessive, to the real needs of this public service, reducing electricity consumption and minimising light pollution. 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 light pollution studies and plans for their reduction. In the case of water treatment, purification and desalination facilities, efficiency improvements due to renovation of water pumping and treatment facilities and, in general, any renovation leading to a reduction in energy consumption.

They are partly included in Component 2 of the PRTR, namely C02.I04: Regeneration and Demographic Challenge Programme (DUS 5000), with EUR 75 million increased to EUR 675 million of budget. It is estimated that 50 % of this budget (EUR 335 million) will be allocated to improving the energy efficiency of public lighting installations owned by municipalities with less than 5.000 inhabitants.

In addition, with funding from the FNEE, a EUR 100 million call for applications for municipal outdoor lighting will be launched in 2023 and will be open to municipalities and counties.

#### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Legislative measures:** The Council of Ministers of 11 October 2022 approved the More Energy Security (+ SE) Plan to strengthen the protection of citizens from the price increase caused by the war in Ukraine, in the framework of the European commitment to energy savings. One of the measures envisaged is the creation of a new scheme to reduce the consumption of outdoor lighting, with the aim of replacing existing systems with more efficient ones, so that there will be interest-free loans covering up to 100 % of the cost of renovation.

Royal Decree-Law 18/2022 of 18 October approving measures to strengthen the protection of energy consumers and to contribute to the reduction of natural gas consumption in application of the Plan + SE brings forward the amendment to ITC-EA-01 of Royal Decree 1890/2008 to bring about

improvements that have been brought to light in these years by technical progress (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 make the energy label visible to the citizen, promoting energy efficiency, given that their exposure to the outside world 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 should be noted that a revision will be published in 2023, increasing 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 aid and funding for this type of equipment and infrastructure, as well as for the implementation of the Sectoral Market Surveillance Plan for Energy Labelling. In the case of actions in publicly owned infrastructure, these programmes will be complemented by the necessary technical assistance on the definition of technical specifications and public procurement.

**Energy Saving Certificates (CAE) system** will enable SNOEE subjects to invest in actions, both replicable and unique, aimed at saving and energy efficiency of cooling equipment, heat and cooling in the tertiary sector, water treatment and desalination processes and lighting installations.

**g) Financial needs and public support**

The total estimated public budget for the development of this measure in the period 2021-2030 is **EUR 3.947 million** for a **mobilised investment volume of EUR 6.333 million**.

## ***Agriculture and fisheries sector***

### Measure 2.14. Energy efficiency in agricultural holdings; irrigation communities and agricultural machinery

#### **a) Description**

The measure aims to reduce energy consumption on farms, irrigation communities and agricultural machinery through the modernisation of existing facilities and the renewal or replacement of agricultural machinery and equipment. The measures will be implemented in synergy with those aimed at promoting renewables in the sector, within the framework of the Agri-Food PERTE, for which more than EUR 1.000 million of public investment is earmarked. In the latter case, it continued the PIMA TIERRA Plan, which began in 2014 and which has made it possible to improve the energy classification of tractors and agricultural machinery (in accordance with the methodology developed by the Agricultural Mechanical Station and the IDAE).

#### **b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period**

The aim of the measure is to achieve a **cumulative final energy saving of 1.296,3 ktoe** in the period 2021-2030.

#### **c) Bodies 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 of co-management and co-financing of energy efficiency measures and actions that respect Spain's distribution of competences.

#### **d) Sectors addressed**

This measure is aimed at owners of agricultural holdings and owners or owners of tractors or agricultural machinery.

#### **e) Eligible actions**

The following shall be eligible:

- The replacement of pumping groups, the installation of frequency changers and static starters in irrigation installations with more energy efficient ones.
- The establishment or modernisation of systems for regulating, controlling and monitoring the irrigation network (collection and storage) that contribute to energy savings.
- Actions on the thermal envelope of livestock plants 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 conservation of perishable products, as well as for air-conditioning of livestock houses and greenhouses.
- Replacement of conventional energy in thermal installation with renewable thermal energy, heat pumps or a combination of them.
- Replacement of indoor and outdoor lighting by more energy-efficient systems using LED technology.
- Renewal of more efficient electric motors in agricultural services.
- Renewal of agricultural machinery, including tractors, self-propelled machinery and towed and suspended machinery, in order to significantly reduce final energy consumption.

#### **f) Mechanisms for action**

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Public aid programmes: funding and ordered support** programmes for agricultural holdings and owners of agricultural machinery.

In 2021, Royal Decree 149/2021 of 9 March regulating the aid programme for energy efficiency measures on agricultural holdings with a budget of EUR 30 million to be managed through the Autonomous Communities was published.

Also in 2021, in the context of Component 3 of the PRTR, Royal Decree 948/2021 of 2 November laying down the regulatory bases for granting State aid for the implementation of investment projects under the Plan to promote the sustainability and competitiveness of agriculture and livestock (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 and the generation of energy from renewable sources, in particular biogas and agricultural biomass.

During 2022, the PERTE for agriculture was approved, which will provide the agri-food sector with 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.

**Energy Saving Certificates (CAE) system** will enable those subject to the SNOEE to invest as efficiently as possible in actions, both replicable and unique, related to energy efficiency in this sector.

**Information:** preparation of guides and training sessions aimed mainly at irrigation communities.

**g) 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 **million**, which will mobilise more than **EUR 4.877 million of total investment**.

### 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, within the framework of the Agri-Food PERTE, for which more than EUR 1.000 million of public investment is earmarked and as part of the European Maritime Fisheries and Aquaculture Fund for Spain (2021-2027).

#### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The aim of the measure is to achieve a **cumulative final energy saving of 555,6 ktoe** in the period 2021-2030.

#### c) Bodies 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 of co-management and co-financing of energy efficiency measures and actions that respect Spain's distribution of competences.

#### d) Sectors addressed

This measure is aimed at owners or owners of vessels (shipowners and associations or organisations), ports, port establishments and aquaculture plants, as well as the owners of port establishments for the reception and storage of fisheries.

#### e) Eligible actions

The following shall be eligible:

- Renewal or replacement of components of vessels, longliners or other vessels (propellers, engines, propulsion systems, hulls and other equipment) so as to improve the overall energy efficiency of the fishing vessel.
- Replacement of pumping, aeration, monitoring, control and digitisation equipment in water plants with more energy-efficient ones.
- Replacement of indoor and outdoor lighting by more energy-efficient systems using LED technology in ports and fishing establishments and fish farms.
- Refurbishment or replacement of refrigeration plants in port establishments with more energy-efficient ones, either replacing refrigerant with lower heating potential or replacing equipment with better seasonal energy performance.

#### f) Mechanisms for action

The policy mechanisms that will enable the achievement of the envisaged savings targets will be the following:

**Public aid programmes: non-repayable aid and financing programmes** for vessels, ports, port establishments and aquaculture plants.

In 2021, in the context of Component 3 of the PRTR, Royal Decree 948/2021 of 2 November laying down the regulatory bases for granting State aid for the implementation of investment projects under the Plan to promote the sustainability and competitiveness of agriculture and livestock (III) under the PRTR was published.

During 2022, the PERTE for agriculture was approved, which will make an unprecedented set of public support available to the fisheries sector to boost the sustainability, research, innovation and digitalisation of the fisheries sector, which will lead to improved energy efficiency.

**Energy Saving Certificates (CAE) system** will enable those subject to the SNOEE to invest as efficiently as possible in actions, both replicable and unique, related to energy efficiency in this sector.

**Information:** preparation of guides and training sessions aimed mainly at irrigation communities.

#### g) 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 **million**, which will mobilise more than **EUR 4.877 million of total investment**.



### 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 primary intensity is the result not only of the catalogue of energy efficiency measures in the end-use of energy to comply with Article 7 of the Energy Efficiency Directive, but also of considering other technological, regulatory and social developments.

These include energy efficiency improvements resulting from technological developments; compliance with new Regulations and Directives; the increase in the occupancy ratio of vehicles in urban and interurban environments due to car sharing penetration; savings in the aviation, maritime and rail sectors resulting from sectoral policies; improving efficiency in energy distribution; the increased penetration of renewable energies in the electricity generation park, etc.

In addition, 6 horizontal measures are proposed that will have an impact on the achievement of the energy efficiency objectives 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, they help to reduce the investment pressure on the part of companies and public administrations by discharging it to 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 18 (1) of Directive 2012/27/EU, aims to promote the establishment of energy service companies by making available to the public both information on the companies providing these services and model contracts for these services adapted to Eurostat's recommendations and in accordance with Law 9/2017 of 8 November on Public Sector Contracts. In addition, and Article 27 of the text agreed in trilogues on 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, in renovations of non-residential buildings with a useful floor area above 750 m<sup>2</sup>, 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) has made it possible to remove 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 keep control of the public deficit.

Similarly, the publication by IDAE and ICAEN of standard specifications for the performance of energy performance contracts by public authorities reduces any barriers that the public sector might encounter if it wishes to make use of them. However, further work is needed, as barriers such as ignorance, doubts under 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 the minimum requirements to be met by an energy performance contract and standard UNE-EN 17463 on the evaluation of energy-related investments (Valeri). This will lead to increased credibility and confidence in such contracts.

##### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The objective is to improve energy efficiency 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) Bodies responsible**

The public authorities responsible for implementing and monitoring the measure will be MITECO jointly with the Autonomous Communities.

**d) Sectors addressed**

This measure is targeted at all energy-consuming sectors, mainly in industry, services and buildings and where the renovation of municipal outdoor lighting has a high potential for this financing model.

**e) Eligible actions**

Basically, all energy performance contracts are so, because they achieve energy savings that are responsible for recouping the investments made by energy service companies.

**f) Mechanisms for action**

The policy mechanisms that will enable the expected savings to be achieved will focus on: regulatory measures developing new model contracts, promoting these companies in the various aid programmes, as well as information and communication. The promotion of energy projects with high potential for energy savings and which allow for the amortisation of investments 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 the energy prosumer and aggregator figure and, ultimately, of new business models around renewable energy generation and demand reduction.

For renovations of non-residential buildings with a useful floor area above 750 m<sup>2</sup>, public bodies shall assess the feasibility of using energy performance contracting, in line with Article 27 of the text agreed in trilogues on the new energy efficiency directive.

To this end, IDAE has drawn up model specifications for the procurement of energy service companies, publishing them on its website in order to serve as an indicative model for the various parties involved in the conclusion of this type of procurement.

Specific mechanisms include:

- **Support programmes for the financing** of energy performance contracting that contribute to reducing the period of return on investment.
- **Energy Saving Certificates (CAE) system** will enable SNOEE subjects to be invested as efficiently as possible in actions, both replicable and unique, undertaken in the framework of energy performance contracts, to the extent that they help to increase savings and reduce the payback period.

**g) Financial needs and public support**

IDAE will regain its role as an investor, acting jointly with energy service companies in energy saving and efficiency and renewable energy projects under the formula of recovering investments through shared savings (under conditions of promotion of both the project and the energy service company), as a way to make the viability and cost-effectiveness of energy saving and efficiency projects in the private sector visible.

**Measure 2.17. Public sector: accountability and efficient public procurement  
energy**

**a) Description**

The measure envisages introducing in public administrations the purchase of goods, works and services with the lowest environmental impact and the highest energy efficiency possible, both in the construction and in the purchase or lease of buildings for their own use.

Accountability

In addition to the procurement of renewable energy (Measure 1.26), all territorial administrations should take a proactive responsibility for 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 to taking a leading and exemplary role in delivering 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.

The revision of Directive 2010/31/EU on the energy performance of buildings, which provides for the establishment of minimum energy performance standards (MEPS) in existing buildings, will involve a major effort of responsibility on the part of the public sector, which should be a frontrunner in meeting and leading on the requirements of MEPS.

Furthermore, 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 and energy-efficient 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 and efficiency criteria in procurement procedures for goods, services and buildings by public administrations<sup>102</sup>.

An instrument to boost and facilitate economic growth from the perspective of a low-carbon, circular economy will be the implementation of the Plan for Green Public Procurement of the General State Administration (2018-2025), approved on 7 December 2018.

Provision is also made for the incorporation of measures aimed at changing the consumption habits of civil servants, which requires accompanying measures, such as training and information and awareness-raising campaigns.

In this regard, the Plan of energy saving and efficiency measures of the General State Administration and state institutional public sector entities was launched in 2022.

Similarly, 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 energy-efficient road transport vehicles obliges public authorities to have a minimum number of clean vehicles in their fleets. This Directive has been transposed by Royal Decree-Law 24/2021 of 2 November.

#### **b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period**

The objective is to achieve energy efficiency improvements over the period 2021-2030 through savings and efficiency actions in the public sector.

It will therefore be necessary to reduce the annual energy consumption of the public sector by 1.9 % per year.

The public procurement measures will be applied to the renewal of the 300.000 m<sup>2</sup> per 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 the mandatory target for the General State Administration to renovate 3 % of the built and air-conditioned area of the public building stock of the Autonomous Communities and Local Authorities.

#### **c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure will continue to be MITECO, together with the Autonomous Communities and in particular the Local Authorities.

MITECO will take steps to ensure that the various entities in the regional and local public sector purchase their goods, services and buildings with a high energy performance on the market.

The Autonomous Communities shall implement in their respective public buildings plans for energy efficiency and for the purchase of goods and services under energy and environmental efficiency criteria.

#### **d) Sectors addressed**

The public sector.

#### **e) Eligible actions**

---

<sup>102</sup>Law 15/2014 of 16 September 2013 on 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 2017 on public sector contracts, which requires the design of award criteria that include environmental, social and innovative criteria aligned with the European policy on green public procurement.

The eligible actions will be those that achieve a reduction in CO<sub>2</sub> emissions and in both primary and final energy consumption.

- Inclusion of labelling, energy and environmental efficiency clauses in public procurement.
- Incorporation of carbon footprint in public procurement.
- Optimising the use of public sector buildings by promoting measures to rationalise the use of buildings by unifying services and grouping staff in the same headquarters.
- Creation of the inventory of roofs and other infrastructures with energy potential of the General State Administration financed with EUR 1.000 million and the energy saving and efficiency plans and the state institutional public sector for Autonomous Communities and local authorities, both financed by the PRTR.
- Specifically for the building stock of the General State Administration, initiate procedures to accommodate both photovoltaic installations for self-consumption and facilities for the supply (pumping of heat or other efficient systems) or storage of energy in heat and cold networks.
- Assessment of the feasibility of contracting energy performance contracts.

#### f) Mechanisms for action

The main policy measure is the Plan of Energy Saving and Efficiency Measures for the General State Administration financed with EUR 1.000 million and the Energy Efficiency and Saving 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 superficial<sup>103</sup> is achieved. These actions will have to be planned and financed by European funds of those planned up to 2023 under the Objective.

<sup>3</sup> from 2014 to 2 018.1457075 m<sup>2</sup> have been<sup>renewed</sup>, which represents compliance with the renovation target set in Article 5 of the Energy Efficiency Directive of 105 %.

Thematic 4 (Lower Carbon Economy) of Spain's Multiregional Operational Programme and future Operational Programmes.

- Strengthening 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 AGE buildings via the web platform entitled 'Sistema Informático de Gestión Energía de Edificios de la Administración General del Estado (SIGEE-AGE)'.
- Training and information actions aimed at the managers and energy managers of the buildings of the General State Administration through specialised publications, IDAE e-learning platform and social networks.
- Promoting interconnection to efficient heat and cold networks, self-consumption and the use of renewable energy in public buildings and, where appropriate, contracting with energy service companies.
- Implementation of a system for regulating the switch-off and switching times and the luminous level of outdoor lighting of buildings, infrastructure and roads (including tunnels) under the responsibility of the General State Administration and the State institutional public sector.
- Putting in place a remote working system in the public sector to reduce the energy impact and make it possible to reduce travel, thereby saving energy and 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 install bicycle parking space.
- Extend this programme to the regional and local administrations.
- Where appropriate, the promotion of energy performance contracting by public authorities, since Eurostat does not regard it as public debt, and thus the investment is not accounted for in the public accounts, but is paid as a service against the energy savings generated by the action.

#### g) Financial needs and public support

They are not necessary as this measure is a good practice in public procurement and in the habits of employees in public administrations.

## Measure 2.18. Energy audits and energy management systems

### a) Description

The measure includes 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 companies, and to groups of companies which, taking into account the aggregate magnitudes of all the companies forming the consolidated group, meet the requirements of a large company, and in order to reduce energy consumption.

However, this will change with the transposition of the new energy efficiency directive, on which trilogues are already agreed between the European Parliament, the Council and the Commission. Under the new Directive, those obliged to do so will be obliged to do so by reason of their consumption. Thus, companies with an average annual consumption of more than 85 TJ in the previous three years will have to implement an energy management system and companies consuming more than 10 TJ per year that do not have an energy management system will have to be subject to energy audits. Recommendations from energy audits will lead to 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 measures identified with the greatest profitability and viability in the short term. Once the new directive has entered into force, the parties obliged to do so will become obliged to do so on the basis of their consumption and not on the basis of their size, as it has hitherto been.

Annex A to the Plan + SE also includes the extension of energy audits to the buildings of the General State Administration, in their exemplary role, identifying the savings opportunities and the main actions to be implemented in their buildings, as well as the implementation of energy management systems in desalination and water purification processes that contribute to reducing energy consumption.

Audits must be carried out by appropriately qualified energy auditors (Article 4 of Royal Decree 56/2016). The inspection should be carried out on a random selection of at least a statistically significant proportion of the obligated undertakings in each four-year period.

Article 6 of Royal Decree 56/2016 establishes the Administrative Register of Energy Audits, which contains the information necessary to identify the undertakings required to carry out audits, the results of inspections by the Autonomous Communities, as well as other information necessary for statistical purposes of sectoral or energy classification.

It is important to note that the performance of audits *per se* does not lead to energy savings. In order to promote these savings, it is important that the audit has minimum quality standards and that the audit results form an element of sound and reliable information so that the relevant energy efficiency measures are actually taken.

There is a potential for significant improvement in this area and the following elements will be reviewed:

- It is appropriate to regulate more precisely the minimum training or professional profile of the technician competent to draw up and sign the audit report
- Promote the implementation of those measures proposed in the audit reports that result in high economic returns or large amounts of savings at reasonable returns. In order to minimise the investment effort of companies, measures related to ESCOs and energy performance contracting shall be disseminated and promoted; and the use of energy savings certificates, PPAs, as an economic incentive measure.

### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The objective is to achieve energy efficiency improvements over the period 2021-2030 through savings and efficiency actions.

Currently (2022) 63.712 installations belonging to 5.444 large companies and groups of companies are audited, with an estimated energy saving potential of 37.871 GWh/a, representing for the 587.046 GWh/a audited energy consumption an average saving of 6.5 % and a necessary associated investment of EUR 7.770 million.

Manufacturing is the sector with the highest number of companies that have submitted audits and the retail sector has submitted the highest number of audits.

The PERTE for the decarbonisation of manufacturing industry should be highlighted here, and it must submit an Energy Efficiency and Ecological Transition Plan.

**c) Bodies 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 of co-management and co-financing of energy efficiency measures and actions that respect Spain's distribution of competences.

MITECO will promote the implementation of this measure.

The Autonomous Communities are responsible for managing the receipt of audits or information from energy management systems and uploading them to the database set up by MITECO as the Administrative Register of Energy Audits.

Similarly, the Autonomous Communities shall establish a procedure for inspecting the performance of energy audits in order to monitor compliance with the obligation in undertakings covered by this Royal Decree, as well as to ensure and verify the quality of those audits.

**d) Sectors addressed**

All areas of economic activity as defined in the CNAE.

**e) Eligible actions**

Obligated companies or groups of companies may use some of the following two alternatives:

- a) Carry out an energy audit that complies with the minimum guidelines set out in Royal Decree 56/2016
- b) Implement an energy or environmental management system, certified by an independent body in accordance with the relevant European or international standards, provided that the management system concerned includes an energy audit carried out in accordance with the minimum guidelines set out in Royal Decree 56/2016.

With the transposition of the new Energy Efficiency Directive, the text of which was agreed in March 2023, as already stated above, the obliged parties will be obliged to do so on the basis of their consumption and not on the basis of their size.

**f) Mechanisms for action**

MITECO has developed an Administrative Register of Energy Audits for the companies required to carry out energy audits, which contains the information reported by the obliged parties in relation to the audits carried out.

Moreover, the public aid and financing support programmes defined in section 3.2.1 of this Plan with a sectoral approach will use mandatory energy audits as the main diagnostic tool for defining the eligible investments needed to achieve the savings. Similarly, energy audits will be promoted in small and medium-sized enterprises that are not affected by the obligation arising from the application of the Directive.

**g) Financial needs and public support**

They are not necessary as they are a regulated mandate.

**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 policies and measures of the Plan', estimates an increase in employment by 522.000 jobs in 2030 compared to the baseline scenario. The objective of this measure is to identify the needs for both vocational and academic training, 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 businesses in the field of energy efficiency. To this end, it is proposed to set up new training courses and to strengthen training for those which will improve the employability of workers and increase the productivity and competitiveness of enterprises. In the framework of the new training, a gender perspective will also be

applied in order to close the gap in technical professions. Investment C23.I3 of the PRTR explicitly envisages the promotion of new skills for the green transition.

In this respect, the measure provides for the establishment of specialisation in higher-level vocational training in energy auditing, which is officially valid throughout Spain, 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, upskilling all, including the labour force, and creating 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 to enable them to carry out their work on ‘low-carbon’ 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 as follows:

- The building sector, focusing on the renovation of the existing housing stock, with the aim of substantially reducing energy consumption in households, while ensuring adequate climate comfort.
- Transport sector, moving towards the replacement of fossil fuels by renewable energy compatible 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 interim period**

The objective is to achieve energy efficiency improvements over the period 2021-2030.

**c) Bodies responsible**

Among those responsible for the design and implementation of this measure are bodies of the General State Administration such as the Ministry of Education and Vocational Training, the Ministry of Universities, the Ministry of Labour and Social Economy, MCI, MITECO, SEPES and INCUAL, with which technical entities such as the IDAE will collaborate, as well as other administrations and organisations, Autonomous Communities, local authorities, energy agencies, sectoral associations for energy saving and efficiency, sectoral associations for renewable energy, training companies, trade unions and professional bodies, among others.

The Ministry of Education and Vocational Training shall establish the corresponding qualification and the basic aspects of the curriculum.

MITECO will be responsible for promoting this new professional activity in the various energy-consuming sectors.

The Ministry of Labour and Social Economy in the identification of training needs, in cooperation with the Autonomous Communities.

**d) Sectors addressed**

The training sector, both vocational and academic.

Specialisation shall be directed towards the sectors of buildings, industrial or commercial facilities or operations, transport linked to the private or public activity or service, with the aim of identifying and reporting on energy flows and their potential for improvement.

**e) 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 organised (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 requirements of productivity and competitiveness of companies.

**f) Mechanisms for action**

Development of investment C23.I3 of the PRTR on acquiring new skills for digital, green and productive transformation.

**g) Financial needs and public support**

The sectors identified in the energy efficiency dimension (transport, residential, tertiary, and agriculture and fisheries) are in an ongoing process of technological improvement related to energy saving and efficiency, making it essential that qualified staff be continuously trained and updated. It is therefore necessary to promote continuous training at both professional and academic levels, developing and introducing new qualifications and specialisations where necessary.

As with the cross-cutting measures proposed in the decarbonisation dimension, in terms of training, the Plan proposes to work on identifying the professional profiles needed to increase energy efficiency in Spain and thus to be able to achieve the energy efficiency objectives set out in this Plan.

The process is based on the identification of the necessary professional profiles throughout the value chain associated with the Plan's energy efficiency improvement measures. The qualification levels will then be adapted to the needs of the labour market resulting from the implementation of the NECP. The associations of the sectors identified in the energy efficiency dimension and trade unions will be working in such a way as to promote the training of loss-making profiles.

There is also a need to improve the knowledge in energy efficiency technologies of those professionals who can, across the board, contribute to the development of energy efficiency. This is the case, among others, for professionals in financial institutions, where better knowledge of these technologies by the financial intermediaries leading the investments would increase financing 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 environmental technologies are developed, it is necessary to continuously monitor and adapt the measures taken, in the light of possible technological changes of an innovative nature.

C23.I3 of the PRTR envisages providing funding to employed and unemployed workers to carry out specific training actions that, according to their profile, are intended respectively to boost their career or improve their employability.



identifying the sectors in which implementation will take place, and training providers.

BORRADOR

## Measure 2.20. Communication and information on energy efficiency

### a) Description

The communication and information measures included in this NECP must comply with the requirements laid down in Articles 12 and 17 of the Energy Efficiency Directive, as well as lead to the necessary transformation of energy consumption habits required by the transition process towards a decarbonised economy in 2050.

### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The objective is to achieve energy efficiency improvements over the period 2021-2030.

### c) Bodies responsible

MITECO, through IDAE, will have a central role in defining and implementing the Plan's communication strategy. IDAE has been regularly developing institutional communication campaigns that have made it possible to demonstrate energy savings under Article 7 of the Energy Efficiency Directive, and has drawn up audiovisual projects, publications and training platforms aimed at consumers in different sectors. IDAE also has experience in creating and managing energy efficiency profiles on social networks.

### d) Sectors addressed

All energy-consuming and financial sectors.

### e) Mechanisms for action

The main driver of the communication strategy of this Plan will be the fight against climate change and the close link between energy consumption and pollutant emissions, with particular emphasis on local pollution and the transformation of city models. To the extent that this Plan is built on the willingness to design a just transition to a new energy model, the communication strategy should provide information in an easy and accessible way to the most vulnerable consumers in order to involve them in the necessary social transformation and reduce energy poverty.

In addition, this Plan proposes actions aimed at financial institutions as necessary actors to mobilise the investments needed to enable energy efficiency improvements by 2030. These actions should improve the knowledge of financial actors in order to reduce the risk perception of energy saving and efficiency investments, which often penalises and limits access to finance for promoters of such projects.

### Measure 2.21. Other measures to promote energy efficiency: transition in high-efficiency cogeneration

#### a) Description

Cogeneration has a strong presence in the industrial sector where it is located in the order of 92 % of installed capacity, with the remaining 8 % in the tertiary and residential sector. The fuel used mainly by cogeneration plants is natural gas, which accounts for 84 % of electricity production and 86 % of heat production, although there are also installations that consume other conventional or renewable fuels.

It is estimated that in 2030 about 2.400 MW of cogeneration capacity will have exceeded their regulatory lifetime and will therefore have left the premium economic regime. The age of existing plants, as well as the need, in some cases, for their redesign to adapt to new circumstances in the processes, means 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 to cogeneration as a back-up system that contributes to the stability of the system and offers the flexibility that the operation of the electricity system will require in order to achieve the targets for renewable electricity generation.

On the basis of the above, auctions covering both the modification of existing cogenerations and the construction of new installations for a total of 1.200 MW over the period 2021-2030 are envisaged. The successful co-generations of the auctions will have an optimised design based on useful heat, self-consumption of electricity, flexibility in their operation towards the electricity system and also high efficiency, contributing to all the objectives set out in this Plan.

#### b) Cumulative and annual expected savings for each measure or amount of savings in relation to any interim period

The measure entails savings of 1.471 ktoe of cumulative primary energy over the period 2021-2030.

#### c) Bodies responsible

Calls for tenders must be conducted by MITECO. In order to draw up specific programmes in non-mainland territories, cooperation between MITECO and the governments of the Canary Islands and the Balearic Islands and cities with autonomous status will be required.

#### d) Sectors addressed

This measure is addressed to companies in sectors that carry out a cogeneration installation.

#### e) Mechanisms for action

The mechanism envisaged is the competitive tendering procedure through the establishment of a multiannual auction calendar, in order to determine a cost-efficient remuneration scheme for the implementation of public support, accompanied by the necessary administrative measures to take advantage of existing infrastructure.

The criteria for application in auctions will include, inter alia, the need for installations to be very efficient, with design optimisation based on useful heat and self-consumption, and to provide flexibility in their operation to meet the requirements that the system operator demands.

Given the importance of self-consumption of both useful and electrical heat in the design of the installation and in obtaining the required efficiency rates, inspection plans will be carried out to ensure the effective use of the heat provided by cogeneration into the process and the levels of self-consumption of electricity.

### 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 balancing and the procurement of ancillary services. Barriers to self-consumption were already removed at the time so that the energy system could start the gradual transition to a generally low-power distributed electricity generation model.

Since the adoption of Law 24/2013 of 26 December 1997 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. For its part, Royal Decree 1048/2013 has introduced incentives that contribute to the reduction of network losses; the first is formulated in such a way that a continuous improvement in the level of losses is necessary in order to achieve an increase in remuneration without penalty, while the second 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 the national electricity infrastructure include the promotion of efficiency based design criteria, the increase of sections of lines and cables, the improvement of power factors and voltages, the renovation of substations, the optimisation of the low-voltage grid and the meshed grid, demand management, the optimisation of the use of smart meters and the reduction of fraud.

In particular, for gas infrastructure, both in transmission networks, distribution networks and regasification plants, a mechanism has been established for recognising losses in installations in order to encourage operators to reduce them.

### 3.2.4. Financial measures. EERF

#### Measure 2.22. Financial measures: National Energy Efficiency Fund

##### (a) Description

Prior to the preparation of the PRTR, the FNEE was the main instrument supporting national energy efficiency initiatives. This Fund was established by Article 72 of Law 18/2014.

Article 20 of the Energy Efficiency Directive allows Member States to set up an Energy Efficiency National Fund, and the revision of Directive 2012/27/EU expressly recognises that obligated parties under the energy efficiency obligation scheme referred to in Article 7 may fulfil the savings obligation by means of financial contributions to the Energy Efficiency Directive, equivalent to the amount of the investments required to fulfil the obligations under that Article.

The Fund may receive contributions from other sources such as the General State Budget. It will receive contributions from European Structural and Investment Funds, ERDF funds 2021-2027, to boost a low-carbon economy.

This Plan proposes **to revitalise and integrate financial institutions as necessary actors** to mobilise investments in energy efficiency and renewable energy, given that the energy transition must be carried out with the help of all public and private actors and all regional authorities, whatever their nature.

### 3.2.5. Energy Saving Certificates Scheme

#### Measure 2.23. Energy Saving Certificates Scheme

##### a) Description

Article 71 (2) of Law 18/2014 of 15 October empowers the Government to regulate a system of accreditation of final energy savings by issuing Energy Saving Certificates (hereinafter 'CAE') which, once in place, allows those subject to the SNOEE to meet all or part of their energy saving obligations at the lowest possible cost, by carrying out or promoting, directly or indirectly, energy efficiency actions in

various sectors. Thus, Royal Decree 36/2023 of 24 January 2014 established the CAE system.

The PPAs 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 2012/27/EU on energy efficiency, so that they can be subsequently accounted for for compliance with Article 7 of that Directive.

Therefore, the CAE system makes it possible to certify savings from actions carried out both under the procedure of standardised or replicable actions and under the framework of individual actions.

Finally, it should be noted that the acceleration in the implementation of this system of energy savings certificates has been included as one of the cross-cutting measures of the energy efficiency block of the Energy Security Plan + approved by the Council of Ministers on 11 October 2022.

Thus, in the context of the SNOEE, and in addition to and as an alternative to the EENF, the voluntary PPA scheme is introduced, which will help to achieve the ambitious cumulative final energy savings target for the period 2021-2030 and will enable:

- i. Improve the economic efficiency of SNOEE by facilitating the achievement of the national final energy savings target.
- ii. Make the way in which obliged parties meet their final energy saving obligations more flexible, allowing all or part of their annual obligation to be met by carrying out energy efficiency measures.
- iii. Enable obligated parties to meet their obligations under the SNOEE at the lowest possible cost.
- iv. To count the savings generated as a result of energy efficiency actions carried out by private entities, whether subject to SNOEE or not, 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.
- v. Providing the opportunity for final consumers 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, with final consumers themselves calling for energy efficiency measures.
- vi. Generating 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.
- vii. Be a catalyst for innovation in the energy efficiency sector, consolidating an atomised sector and increasing its operational efficiency.

Each year, by ministerial order, each of the SNOEE subjects is assigned a savings obligation. Previously, those obligations could be satisfied only by means of financial contributions to the FNEE.

With the entry into force of the PPA system, part of this annual savings obligation can be met by the liquidation of PPAs, respecting a minimum financial contribution to the EENF that guarantees the necessary resources for the mechanisms and actions financed by it. Thus, each obligated party may decide either to contribute to the FNEE or to liquidate PPAs in order to fulfil part of their obligation, taking that decision on the basis of the costs incurred for them by each of these two options.

#### **b) Cumulative expected savings**

With the introduction of the PPA system, cumulative savings of 11.586,68 **ktoe** of final energy are expected to be achieved over the period 2021-2030.

#### **c) Sectors addressed**

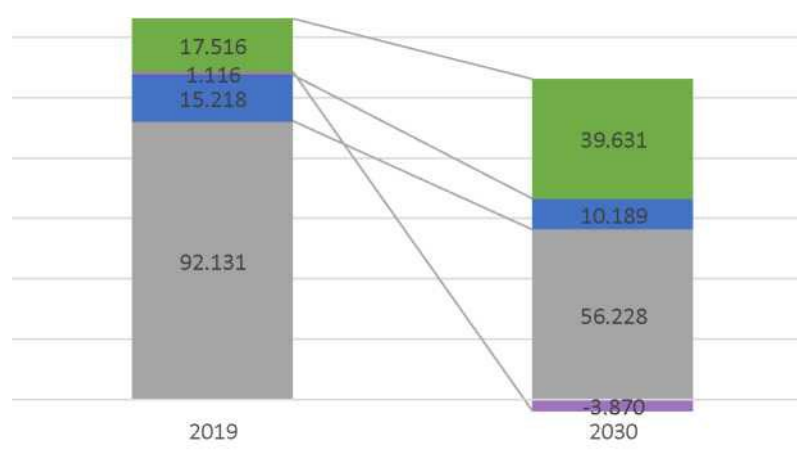
This measure is targeted at all sectors of economic activity listed as eligible under the SNOEE in the Energy Efficiency Directive.

### 3.3. DIMENSION ENERGY SECURITY

Since the preparation of the current 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 reducing external dependence on fossil fuel imports.

As pointed out in the European REPowerEU proposal, presented by the Commission on 8 March 2022, in response to difficulties 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 cross-cutting element of this plan and which brings about a reduction in total energy consumption, and, on the other hand, the increase in renewable participation in the energy mix, which displaces fossil fuel consumption. On this last point, it is worth noting the importance of the development of indigenous renewable energy sources, which represents, in terms of control over the primary resource, of which Spain has a high potential, given our geographical and climatic characteristics, particularly in the solar and wind fields.

As a result of this set of measures to increase energy efficiency and boost indigenous renewable technologies, imports into physical units of fossil fuels rose from 92 Mtoe in 2019 to 55 Mtoe in 2030, a decrease of 40 %. This significantly reduces the energy dependency ratio from 73 % in 2019 to 51 % in 2030, increasing national energy security.



**Figure 3.6. Primary energy mix in Spain in 2019 and 2030 (ktoe)**

Primary energy mix PNIEC 2023-2030 (ktoe) 140.000

120.000  
100.000  
80.000  
60.000  
40.000  
20.000  
0

Source: Ministry for Ecological Transition and the Demographic Challenge, 2023

■ Fossil Energies ■ Nuclear ■ Other ■ Renewable

REPowerEU aims to make Europe independent from Russian fossil fuels well before 2030 through the implementation of various measures based on three main axes:

- Energy saving
- Accelerate the energy transition
- Diversification to find alternative energy suppliers.

The REPowerEU package operates in three different time ranges: short, medium and long term. In the first period, the proposal includes a set 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 wishing to participate, as well as for Ukraine, Moldova, Georgia and the Western Balkans
- New energy partnerships with reliable suppliers, including on future cooperation on renewable 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
- EU-coordinated demand reduction plans in case of gas supply disruption.

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 of frontloaded projects under 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 for energy savings by increasing the EU-wide efficiency target from 9 to 13 % by 2030 (the final figure will be defined with the adoption of the updated Energy Efficiency Directive).
- 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 achieve 202 517.5 GW of electrolysers and feed EU industry with indigenous production of 10 million tonnes of renewable hydrogen
- A modern regulatory framework for hydrogen

Furthermore, at regulatory level, and in the framework of 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 as regards gas storage. This Regulation, inter alia, established an obligation for Member States to maintain a level of stocks in underground storage 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 measures for the reduction of gas demand, which sets a voluntary target for natural gas demand reduction of 15 % compared to the average over the last 5 years in all Member States. In addition, should the alert status be declared in the Union, the target will become mandatory in all the 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 establishing a framework for accelerating 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 gas demand reduction measures 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.

In relation to the storage of natural gas, prior to the adoption of the European Regulation, Spain approved Royal Decree-Law 6/2022 of 29 March adopting urgent measures as part of the National Plan to respond to the economic and social consequences of the war in Ukraine, amending Royal Decree 1716/2004 of 23 July regulating the obligation to maintain minimum security stocks, diversification of natural gas supplies and the corporation of strategic stocks of petroleum products, in order to increase the obligation to maintain stocks that users have to keep in underground storage, from 20 to 27,5 days of sales or consumption in the previous year, further strengthening security of supply. The 27,5-day obligation fulfils the obligations to reach 80 % of the maximum natural gas storage capacity by 1 November 2022. Minimum security stocks are divided into:

- Minimum security stocks of a strategic nature, 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 shall 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.

Another important issue in recent years is the need for technologies at national and European level for the transition to a net-zero economy. In this regard, measure 1.18 has been included in this update: "Strategic autonomy and value chain" to highlight the importance of having supply chains for different technologies. This is also in line with the proposal for a net-zero industry regulation, which highlights the need for 40 % of the technologies needed for the energy transition to be produced in Europe. This objective, which is reflected in an increase in the availability of national technology, is at the same time an opportunity in economic terms and in terms of job creation. The measures referred to in Chapter 3.5 shall also contribute to that objective. Research, innovation and competitiveness dimension.

Thus, some of the policies and measures of the energy security dimension fall within the remit of the Specialised Committee on Energy Security (set up 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 carrying out the duties assigned by the latter in the field of energy security and within the framework of the National Security System.

The tasks assigned include the assessment of risks and threats, the analysis of possible crisis scenarios (in particular those likely to result in a situation of interest for national security in the field of energy security), as well as the evaluation of the results of their implementation, in coordination with the bodies and authorities directly competent and the Specialised Situation Committee.

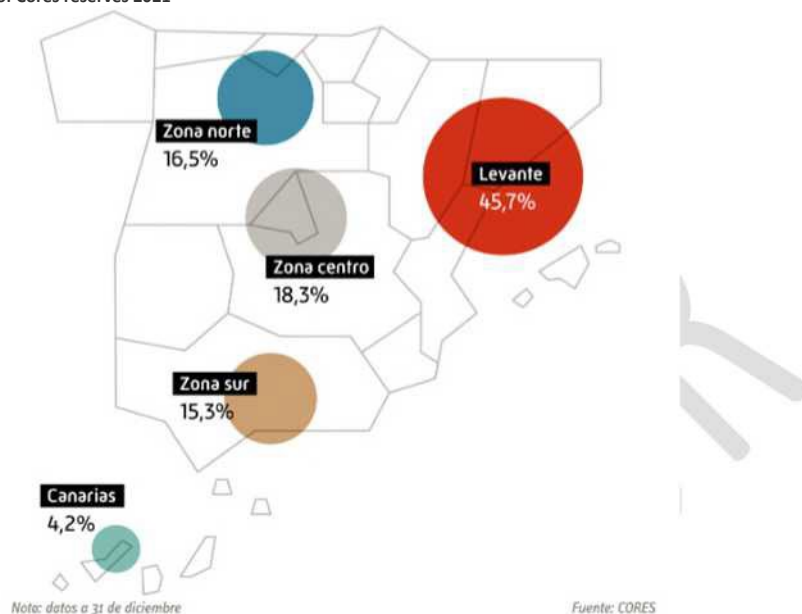
On the other hand, Objective 2 of the National Energy Security Strategy establishes the need to 'consider all energy sources in order to maintain a balanced mix that correctly reflects all the specific features of Spain and that makes it possible to achieve a certain guarantee of supply, at competitive prices, and within a sustainable model in which clean energy gradually becomes more important'.

Specifically, in the area of liquid hydrocarbons, the reference standard is Royal Decree 1716/2004 of 23 July 2007 regulating the obligation to maintain minimum security stocks, diversification of natural gas supplies and the Corporation of Strategic Reserves of Petroleum Products (CORES, which plays the role 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**

Geographical distribution of Cores reserves 2021



**Table 3.3. Evolution of the location of strategic stocks of petroleum products in Spain**

		2017	2018	2019	2020	2021	TV (%) 2021/2020
		<i>Unity: cubic meters</i>					
Northern	Products	879.753	862.242	852.392	869.042	850.293	− 2,2
	Unbleached	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
	Unbleached	154.368	154.228	169.228	169.228	169.228	–
Canary	Products	327.783	327.718	327.718	327.718	280.071	− 14,5
	Unbleached	0,0	0,0	0,0	0,0	0,0	–
Release	Products	2.055.394	2.120.424	2.125.676	2.154.513	1.954.258	− 9,3
	Unbleached	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
	Unbleached	450.356	462.084	386.640	310.733	310.516	− 0,1

*Note: Data as at 31 December*

*Source: CORES*

*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 with the release of 6 million barrels of oil from the minimum security stocks managed by the industry. This release of stocks reduced the obligation to hold security stocks by 2,6 days initially and by 5,6 additional days thereafter, so that for a period of 2022 the minimum security stock requirement was 84,2 days. These contributions sought to alleviate market tensions 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 capabilities to prevent, detect and respond to cyber-attacks, enhancing and adopting specific measures to contribute to the promotion of a secure and trustworthy 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 multipliers of these opportunities and challenges.

According to the 2021 Annual National Security Report, most attacks result from the injection of harmful software, 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 cyber-attacks by ransomware caused a significant impact on some public bodies.

A matter of strategic importance for national security is the issue of critical infrastructure. There has been an increase in attacks by state actors aimed at exploiting vulnerabilities of critical infrastructure information systems along three main axes: cyber (hybrid strategies), cyber espionage and influence operations (disinformation). The purpose of attacks is often to obtain information on the degree of implementation of organisations' comprehensive security measures, in order to have sufficient data to enable them to plan future attacks. Of the 10.531 incidents reported in 2021 to the Security Coordination Office related to the Strategic Sectors, 207 were in the field of Energy.

Other technologies being developed include those related to electrification and automation of vehicles, 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 2006 on the identification and designation of European Critical Infrastructures and the assessment of the need to improve their protection is implemented by Law 8/2011 of 28 April 2007 establishing measures for the protection of critical infrastructure and by Royal Decree 704/2011 of 20 May approving the Regulation on the protection of critical infrastructure. In accordance with the provisions of this Royal Decree, the designated critical 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 the threats and challenges to critical infrastructures in the energy sector and the nuclear industry, updating the information contained in these 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 changes 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 infrastructure 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 concerning measures for a high common level of security of network and information systems of the Union (NIS Directive), in a rapid and simple manner, as 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, on the security of network and information systems, developed in Royal Decree 43/2021 of 26 January 2007, transposed the above-mentioned NIS Directive into Spanish law, which has provided a significant boost to the cybersecurity of essential energy services.

In addition to this legislative update, Spain adopted in April 2019 its National Cybersecurity Strategy, the function of which is to develop the forecasts of the 2017 National Security Strategy in the field of cybersecurity, and which replaced the previous one, approved in 2013. Subsequently, following the mandate issued by the National Security Council and developing the 2019 National Cybersecurity

Strategy, the National Cybersecurity Plan was approved in March 2022. It should also be noted that, since 2015, Spain has had a **National Energy Security Strategy**, which, in view of the significant regulatory, technological and energy policy changes that have taken place in these years, is expected to be updated shortly.

Public-private cooperation with the various energy operators has also been stepped up and strengthened, and this work has been coordinated by the Cyber Coordination Office (OCC) of the National Centre for Critical Infrastructure and Cybersecurity Protection (CNPIC) in the field of reporting cyber incidents. Attention should also be drawn to the work carried out in this area by the National Institute of Cybersecurity (INCIBE), a body attached to the Ministry of Economic Affairs and Digital Transformation (MINECO).

Reference should also be made to Commission Recommendation (EU) 2019/553 of 3 April 2019 on **Cybersecurity in the Energy Sector**. This Recommendation sets out the key issues in this area, urging Member States to include them in national legislation and to report regularly to the European Commission on their implementation status. Spain intends to systematically implement the recommendations on real-time energy infrastructure requirements, 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 technologies*).

In the specific area of the electricity sector, the proposal for a Cybersecurity Network Code for cross-border flows of electricity should also be highlighted. This code, provided for in Article 59 of Directive 2019/944 of 5 June 2019 on the internal market in electricity, which is still to be adopted as a Commission delegated act, should include, inter alia:

- A common framework for electric cybersecurity aimed at standardising the measures implemented to protect the EU's 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 monitoring and reporting on cybersecurity 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 approved an ambitious **Plan + Energy Security which** aims to increase Spain's energy security also in the face of energy price developments and to contribute to the security of supply of the European Union, identifying measures in three main categories:

- Energy saving and efficiency measures that reduce final demand for gas and electricity through better management, reduced energy intensity of activities or more prudent use.
- Measures to accelerate the energy transition and enable the substitution of natural gas and other fossil fuels with renewable energy sources, not only in view of winter 2022-23, but also in the longer term, accelerating the reduction of fossil fuel dependency.
- Measures to strengthen energy autonomy in our country, providing demand-side instruments to provide flexibility in times of stress, as well as short-, medium- and long-term actions to reduce energy dependence, but also technological and material dependence, on our country and the vulnerabilities it entails.

Additional measures of solidarity with the other EU Member States have been added to these measures.

**b) Objectives addressed**

In aggregate, with the introduction of these measures, natural gas consumption savings of 21 % have been generated between August 2022 and March 2023. In addition to increasing the protection of vulnerable consumers, the measures have made it possible to boost energy transition, replacing natural gas and other fossil fuels with renewable energy, for example by extending the support programme for self-consumption by EUR 500 million, among many other measures. In aggregate, it is estimated that the implementation of these measures, with a high level of involvement of all actors, can generate savings in natural gas consumption between August 2022 and March 2023 of between 5.1 % and 13.5 %.

**c) Mechanisms for action**

The Plan includes a total of 73 measures, with a relevant consensus between private actors and public 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 substitution of fossil fuels with 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 opt for the transition.
- Strategic autonomy, generating a more robust and flexible energy system with fewer external dependencies.
- Solidarity, contributing to security of supply and economic activity in Europe, thereby also strengthening security in Spain.

**d) Bodies 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 equivalent days of sales or computable consumption, which must be maintained at all times. Of these 92 days, the Corporation of Strategic Petroleum Reserves, CORES, holds 42 days (strategic stocks), while the industry maintains the remaining 50 days (industrial reserves).

Stocks of petroleum products, crude and raw materials in December 2021 were 14.228 thousand tonnes held in the form of:

- Raw materials and raw materials: 34.1 % of total
- Petroleum products (petrol, kerosenes, gas oils and fuel oils): 65.9 % of the total.

These reserves represented 115 days of net imports, according to the calculation methodology laid down in Directive 2009/119/EC, exceeding the European requirement of 90 days. The reserves were maintained exclusively on national territory.

#### b) Obligated Petroleum Persons

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 provided by wholesale operators and retail distributors).
- The maintenance obligation for petroleum products falls into three product groups:
  - Petroleum groups: automotive and aviation petrol.
  - Medium distilled groups: motor fuel oils, other gas oils, aviation kerosenes and other kerosenes.
  - Fuel group.

The obligation for each product must remain in that product or another product belonging to the same group, but there is also the possibility of holding stocks in the form of raw materials, albeit subject to 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 safety stocks in Spain currently amounts to 27,5 days of firm sales or consumption in the previous calendar year, which must be maintained in full by the obliged parties and in underground storage.

CORES is the body responsible for monitoring the maintenance of minimum security stocks, however, it does not maintain strategic stocks of natural gas.

Minimum security stocks are categorised as:

- Minimum security stocks of a strategic nature, 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 shall 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 made available for commercial use without further restriction.

#### d) Obligated persons Gas

As regards the minimum safety stocks of natural gas, in accordance with the aforementioned Article 98 of Law 34/1998 of 7 October 2007, the persons required to maintain them are:

- Natural gas traders, by virtue of their final sales in the national territory.
- Direct consumers on the market, in the part of their consumption that is not firm supplied by authorised traders.

#### e) Mechanisms for action

The draft Royal Decree amending Royal Decree 1716/2004 of 23 July in order to bring it into line with Commission Implementing Directive (EU) 2018/1581 of 19 October 2018 amends Council Directive 2009/119/EC as regards the methods for calculating storage obligations. This legislation transposes into national law the modification of the sales or consumption period used to calculate the obligations to store minimum security stocks and to comply with international obligations in the most efficient way. Efficiency is determined, among other things, by location, cost, obligated persons and products.

Particular attention needs to be paid to the energy dependence of non-mainland territories. In particular, the Canary Islands, with a primary energy dependency of 97 % in 2019 and an isolated electricity system, require a greater effort to interconnect islands, as well as further development of technologies to support their decarbonisation (both aspects included in other dimensions of this Plan).

### Measure 3.3. Reducing energy dependency on islands

#### a) Description

Since the preparation of the current NECP, 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 Balears, respectively, have been drawn up in March 2022.

The **Sustainable Energy Strategy for the Canary Islands**, based on the current NECP, aims to reduce the islands’ energy dependence 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 Canary Islands’ energy transition in the coming years, thus enabling progress in the decarbonisation planned for 2040, in accordance with the Canary Islands Climate Emergency Declaration approved by the Government Agreement in August 2019 and ratified by the Canary Islands Parliament in January 2020.

This Plan will serve as a lever to meet the objective of reducing by at least 50 % the contribution to the electricity mix of fossil fuel plants located in the Canary Islands in 2030 compared to the current situation in 2019.

For its part, the **Investment Plan for the Energy Transition of the Balearic Islands** aims to promote an Agenda for Energy Transition in the archipelago. This Plan aims to achieve a socially just energy transition, accelerate this transition in the Balearic Islands and address unique challenges of this territory that have not been addressed in other aid lines. The plan is endowed with EUR 233,34 million and is divided into three main axes (energy transition finance offices, aid to boost the energy transition and investments in 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-fired power plant closed 2 of its 4 groups in 2020, leaving the remaining 2 as a reserve, with a limit of 500 hours of operation per year until the Balearic electricity system is effectively integrated into the mainland system.

#### b) Bodies responsible

The public authorities responsible for the implementation and monitoring of the measure are MITECO, together with the respective Autonomous Communities.

#### c) Mechanisms for action

The current planning of the electricity transmission network, with the 2021-2026 horizon, proposes ambitious investments in the electricity transmission network in non-mainland territories, with various objectives including interconnections between systems that increase security of supply and reduce generation costs, as



well as further integration of renewable electricity generation.

The current planning provides for an interconnection between the non-mainland territory of Ceuta and the Iberian 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 promote renewable generation that take into account the specificities of these territories and make it possible to take advantage of the savings in system costs associated with the introduction of renewable energy, in line with the provisions of Measure 1.22 of this Plan.

#### **d) Financial needs and public support**

In accordance with the 2021-2026 Electricity Transmission Network Development Plan, in this period it is planned to invest EUR 1.109 million in links to the mainland in the Autonomous Community of the Balearic Islands, EUR 104 million in links and EUR 307 million in new actions in Ceuta and EUR 216 million in links.

As regards further diversification of indigenous energy sources, this will be done following technical progress, and envisages the following measure.

### Measure 3.4. Recharging points for alternative fuels

#### **a) Description**

The deployment of alternative fuels recharging points will continue to be promoted, in line with the proposal for a Regulation of the European Parliament and of the Council on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council.

With regard to the regulatory framework applicable both to the deployment of recharging points and to the regulation itself of the activity of providing recharging services, a set of regulatory reforms aimed at organising activity and encouraging its deployment have been adopted.

On the one hand, Royal Decree 184/2022 of 8 March 2022 regulating the activity of providing energy recharging services for electric vehicles has laid down the basis for the provision of this service, establishing rights and obligations for all actors involved (directly or indirectly) in the provision of the recharging service.

Royal Decree-Law 23/2020 of 23 June, approving measures in the field of energy and in other areas for economic recovery, established a system of authorisation and declaration of public utility for certain electrical infrastructures with a power of more than 250 kW intended for the installation of recharging stations or points, thereby encouraging their deployment and deployment.

Royal Decree-Law 29/2021, of 21 December, adopting urgent measures in the energy field to promote electric mobility, self-consumption and the deployment of renewable energy, once again simplified formalities at local level for the installation of recharging points on national territory.

Also, as an economic incentive instrument, the creation of a specific tariff segment for electricity transmission and distribution tolls 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 achieve greater electrification of the transport sector and to increase the use of alternative carbon-free fuels as a guideline for achieving emission reductions in the transport sector.

#### **c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure are MITECO, MITMA, MINCOTUR, together with the Autonomous Communities and, in particular, the Local Authorities.

Electricity distribution companies also play a key role in the deployment of charging infrastructure for electric vehicles.

#### **d) Sectors addressed**

This measure targets the electricity, transport and renewable fuel production sectors.

#### **e) Mechanisms for action**

Directive 2014/94/EU of 22 October 2014 on the deployment of alternative fuels infrastructure and Royal Decree 639/2016 of 9 December establishing a framework of measures for the deployment of alternative fuels infrastructure, which transposes it. The specific case of electric vehicles is addressed in Measure 2.4 of this Plan.

Pursuant to Article 15 of Law 7/2021 of 20 May on climate change and energy transition, the map of recharging points has been put into operation at the National Access Point (NAP) of the Directorate-General for Traffic and on the Ministry of Ecological Transition's geoportal. That law also lays down the obligation to install recharging points for certain service stations with large volumes of sale.

Royal Decree 184/2022 of 8 March 2007 regulating the activity of providing energy recharging services for electric vehicles has laid down the bases for the provision of this service, establishing rights and obligations for all actors involved (directly or indirectly) in the provision of the recharging service, thus contributing to the planning of the service.

#### **f) Financial needs and public support**

The impact analysis chapter analyses these costs.

In terms of preparing for constraints or interruptions in the supply of energy sources, the following measures contribute to the achievement of the objectives set:

### **Measure 3.5. Boosting regional cooperation**

#### **a) Description**

The increase in physical electricity interconnections with neighbouring energy systems helps to reduce the potential impacts of limitations or interruptions in the domestic supply of energy sources. In addition, it favours the optimisation of the use of existing capacity by reducing barriers to energy exchange.

In this area, it should be recalled that the regulatory authorities maintain continuous contact with their regional counterparts for 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 in the case of electricity, with Spain's participation in the continuous intraday market.

Similarly, system operators maintain regular contact at regional level to analyse and ensure security of supply, implement European legislation and ensure effective use of international interconnections through the European Network of Transmission System Operators for Electricity (ENTSO-E) and other working groups.

In addition, even if this issue is further addressed in the Internal Energy Market dimension, it should be noted that increasing 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) Bodies responsible**

MITECO.

#### **d) Sectors addressed**

Energy sector as a whole.

#### **e) Mechanisms for action**

Regular meetings with France and Portugal to discuss energy security as well as the most important topics in the field of energy that have been encountered 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.

### Measure 3.6. Deepening contingency plans

#### a) Description

Internally, the Spanish energy system is in an advanced position in terms of contingency preparedness. In this regard, it is worth highlighting the role of Law 8/2011 of 28 April 2007 establishing measures for the protection of critical infrastructure, and its implementing regulation, based on European legislation. However, it is necessary to deepen this preparation, 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 objective of the preventive and emergency plans is to prevent the occurrence of incidents that may have a significant impact on supply or generation groups, to minimise the extent and extent of incidents once they occur, and to bring the electricity system back to the normal state of operation following severe incidents that have caused breakdowns. To this end, global and zonal safety analyses are carried out assessing the risk of supply failure that could arise from own production resources, taking into account the availability of fuels, hydroelectric reserves in reservoirs and water supply, with various scenarios of demand and availability of generation groups.

At European level, mention the adoption of the Regulation establishing a network code on emergency and restoration of the service<sup>104</sup> detailing a number of requirements to ensure security of supply, conditions to be met by operators, list of priority managers and users, suspension and restoration rules, settlements and test plans. In addition, 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 requires Member States to draw up a risk-preparedness plan for the electricity system as a whole. This plan is intended to be an all-encompassing document covering all the 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 focus, including, inter alia, the impacts that the scarcity of certain raw materials (e.g. reduction of natural gas supply to Europe) may have on the electricity system. The risk preparedness plan for the electricity sector in Spain is awaiting approval at national level following the preparation of a first draft sent to the European Commission in June 2021.

As regards the gas sector, the Preventive Action Plan and the Emergency Plan pursuant to Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard the security of gas supply were prepared and forwarded to the European Commission in 2019. These plans are currently being revised so that they can be notified to the Commission. Mention should also be made of the Gas Storage Regulation which has established mandatory filling levels for Member States for winter 2022-2023 onwards.

The Preventive Action Plan minimises the risks identified with a view to ensuring gas supply to all gas customers and especially protected customers. For its part, the Emergency Plan contains the actions to be taken in the event of an emergency of the gas system in order to ensure supply to all customers on the gas market and especially to protected customers.

These plans are drawn up on the basis of the National Risk Assessment, the update of which was notified to the Commission in October 2022, in which compliance with the rules on infrastructure and supplies laid down in Regulation (EU) 2017/1938 must be ensured. The main conclusions of the current risk assessment of the Spanish gas system include the following:

- None of the risks identified and analysed poses a problem of gas supply to protected customers.
- Criterion N-1, as entry capacity, is incorporated as a design criterion in the mandatory planning of the gas sectors in Spain. Therefore, with the planned infrastructure over the period analysed, the value of the N-1 formula laid down 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.
- The highest 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 taken place so far. Even during the period of instability in that country during the 1990s, imports from the country continued, so this event is considered unlikely.

The Risk Assessment, the Preventive Action Plan and the Emergency Plan for the Spanish gas system should be updated every 4 years.

<sup>104</sup>Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on emergency and restoration of service

The following amendments are also envisaged with a view to establishing objectives and measures for the security of natural gas supply at regional level, so that:

- The infrastructure standard (N-1) of Article 5 of Regulation (EU) 2017/1938 is to be met at regional level, taking into account the existing level of interconnection.
- The supply standard of Article 6 of Regulation (EU) 2017/1938 should be complied with at regional level, taking into account the overlapping of different national demands and the existence of different national measures to comply with them.
- The Preventive Action and Emergency Plans are drawn up at regional level.

In order to comply with the above, regions other than the risk groups set up in Annex I to that Regulation must be established.

The Plan + SE (see Measure 3.1) contains a number of measures to act according to contingency scenarios.

#### **b) Impact of the measure**

Improving the country's energy security.

#### **c) Bodies responsible**

The public authority responsible for the implementation and monitoring of the measures is MITECO.

#### **d) Sectors addressed**

This measure targets the energy sector as a whole.

#### **e) Mechanisms for action**

The main actions will aim at:

- 1) The development of the National Security Strategy through the Specialised Committee on Energy Security.
- 2) Final approval of the risk-preparedness plan in accordance with Regulation 2019/941
- 3) The evolution of the various preventive and emergency plans in the area of electricity, gas and oil derivatives.

In the petroleum products sector, the following actions are considered necessary:

- Update of the Crisis Contingency Plan for Oil Markets: a confidential document drawn up by CORES and updated periodically in accordance with the criteria laid down by the IEA, setting out four stages of action, which are less serious in terms of possible difficulties in the supply of crude and petroleum products.
- Update of the plan for measures to restrict demand in the event of crises in the oil market: confidential document, drawn up in 2015 by the MERCOP group (Measures to restrict Oil Consumption), specifically created for that purpose and including various ministerial departments and bodies of the General State Administration.
- Participation in emergency exercises regularly held by the European Commission and the IEA. Example, Spain's participation in the ERE 9 emergency situation simulation organised in 2018.
- Modification of the methods of collecting information in order to have up-to-date information on the stocks of petroleum products managed by the industry.

In addition, in order to achieve a certain level of energy security at regional level within the EU framework, it is necessary to establish objectives and measures for the security of supply of petroleum products at regional level, so that:

- 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.
- Review the proportionality of the level of the obligation and the methodology for accounting for stocks, both in line with the reality of the global oil market and the state of the art.
- The method of compliance with the obligation is reviewed so that the methodology for recording stocks incentivises them to be constituted as a finished product.
- The method of compliance with the obligation is reviewed, so that the methodology for accounting for stocks incentivises them to be built close to consumption centres, taking into account the mobilisation times.
- General rules are laid down for the procedure for authorising the fulfilment of an operator's obligations by means of stocks held on the territory of other Member States.

At the level of the International Energy Agency, Spain is actively involved in the development of a new accounting system for stocks of petroleum products to ensure their quality, accessibility and effectiveness.

### Measure 3.7 Planning for safe operation of a decarbonised energy system

#### a) Description

While the forecasts in this Plan allow for compliance with the supply guarantee 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 the operation with full guarantees of electricity system supply under such 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 commitment to renewable energies in the electricity generation sector implies greater variability in generation profiles. This variability from the supply side can be offset by the development of various large-scale electricity storage solutions from the same supply side (hydro pumping, batteries or other), as well as greater firmness and manageability of the 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 set out in 'Measure 1.5. Energy storage'.

In the same vein, technological progress makes it possible for a number of technological solutions not yet fully addressed in the electricity sector regulation, but which have an important role to play in ensuring the continuity of electricity supply, in particular those which make it possible to make intensive use of information and communication technologies in the energy system.

Thus, also contributing to the Internal Market dimension of energy, 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 carried out in Royal Decree 244/2019.
- Further removal of barriers related to the electric vehicle, such as the removal of the charge manager (see Measure 2.4). Royal Decree 184/2022 of 8 March 2007 regulates the activity of providing energy recharging services for electric vehicles.
- Enhancing forms of aggregation of generation, demand response and storage.
- Participation of renewable technologies in larger electricity system services: management of turnouts, regulatory services, etc. (see Measure 4.6)

As regards the participation of renewables in electricity system services, Spain is one of the pioneering countries in allowing renewable energy to participate in the various balancing services. Since February 2016, these facilities have been able to participate in the markets for adjustment services of the system, subject to the qualification tests. At the beginning of 2018, around half of wind generation had already been authorised to participate in imbalance management and tertiary regulation services, which demonstrates the good progress made in integrating renewables into these services. Currently the share of wind technology in balancing services is 20 per cent, which highlights the ability of these technologies to provide flexibility to the electricity system, a critical element to ensure that decarbonisation objectives are met. The role played in this area by the system operator, whose control centre currently allows 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) Mechanisms for action

In line with the principle of technological neutrality, MITECO, CNMC and the System Operator will identify the technologies, procedures and mechanisms to ensure the supply free of greenhouse gas emissions, with sufficient anticipation to ensure supply by meeting the path towards climate neutrality in 2050 and avoiding the need for new investments in fossil technologies to guarantee supply.

#### d) Bodies responsible

The public authorities responsible for the implementation and monitoring of the measure are: MITECO, the System Operator and CNMC.

### Measure 3.8. Strategic raw materials for the energy transition

#### a) Description

In the process of green transition and changing the global economic paradigm we are facing, a review of all economic activities, and in particular those related to the extraction of mineral resources, is needed to ensure their social, environmental and economic sustainability, while promoting a sufficient degree of strategic autonomy. In particular, the energy transition towards a generation model 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 the European Parliament points out, the transition to climate neutrality should not lead to the replacement of dependency [on third countries] on fossil fuels with dependence on other raw materials.

In response to this structural situation, the Roadmap for the Sustainable Management of Mineral Raw Materials, endorsed by the Council of Ministers on 30 August 2022, focuses 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 mineral raw materials industry, in a circular economy context, and to secure the supply of indigenous mineral raw materials in Spain in a more sustainable, efficient way, and to maximise profits 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 on those considered essential for the energy and digital transition, due to their massive use in the deployment of renewable energy, batteries for electric vehicles, medium and long term energy storage, etc., aligning with European policies on access to resources and sustainability, which are key factors for the EU's resilience.

The design and development of the Roadmap must create a reliable and stable framework that enables and, where appropriate, incentivises domestic and foreign investment, which will promote the sustainability, competitiveness and productivity of companies, as well as the transition of this industry towards a more sustainable economic and social model, contributing to the creation of wealth and employment for Spain, and to meeting the challenge of the demographic challenge.

#### b) Objectives addressed

- Ensure security of supply and reduce strategic dependencies by diversifying supply in the import of mineral raw materials.
- Foster industry and circular economy of strategic mineral raw materials for the energy and digital transition.

#### c) Mechanisms for action

In order to boost strategic autonomy and promote the strategic mineral raw materials industry, the following measures are envisaged:

- Boosting the circular economy and the recycling of strategic raw materials
- Improvement of the Mines regulatory framework for sustainability and compliance.
- Alignment of mining legislation with legislation on strategic industries.
- Drawing up a list of strategic mineral raw materials for the energy transition in order to secure their supply to industry.
- Improvement of vocational training and qualification. Adaptation to digitalisation.
- Promoting innovative projects for mineral raw materials value chains strategic.

#### d) Bodies responsible

General State Administration, Autonomous Communities and local authorities.

### Measure 3.9. Cybersecurity in the energy sector

#### (a) Description

The evolution of the various technologies in the energy sector, as well as the introduction of IT tools for energy control and management, require the security standards of the different systems to be adapted and to ensure adequate protection for users, operators and their data.

With regard to the legislation for the protection of critical infrastructure in Spain, Royal Decree-Law 12/2018 of 7 September 2007 on the security of network and information systems, developed in Royal Decree 43/2001 of 26 January 2007, 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, in April 2019 Spain approved its National Cybersecurity Strategy and the National Cybersecurity Plan in March 2022. It should also be noted that, since 2015, Spain has had a National Energy Security Strategy, which is expected to be updated shortly in the light of the significant regulatory, technological and energy policy changes that have taken place in these years. Finally, Spain is implementing the Commission Recommendation to Member States on Cybersecurity in the Energy Sector<sup>105</sup>, on 3 April 2019, which emphasises the cascading effects of potential cyber-attacks on the increasingly interconnected electricity and gas networks.

There is a need to standardise *software* and *hardware* security protocols, developing specific quality regulations for connected systems that consider cybersecurity as a design parameter in installations and applications, at *hardware* and *software* level.

Interoperability is considered to be the key to balancing the potential of many of the energy sectors. This requires reviewing and determining the applicability, scope and consistency of the certification requirements for protocols and communication systems of energy management systems (production, transmission, distribution, storage and consumption). Protocols should be encrypted, authenticated, so as to be compatible and secure cybersecurity, in accordance with the requirements set out in Regulation (EU) 2019/881 on information and communication technology cybersecurity certification.

The same level of data security and protection should be ensured for large and micro networks. In addition, it will be necessary to establish rules and standards for smart home appliances and other devices in the field of IoT (Internet of Things) in order to ensure their interoperability and maintain privacy and cybersecurity. An example of the requirements is the European Commission's recommendations on the cybersecurity of 5G networks.

In particular, in the case of storage in electric vehicles and systems behind the meter, harmonised standards for system operation and communication of equipment are required, such as the use of *vehicle to grid* technologies, communication protocols in the cross-charging infrastructure of electric vehicles, among others.

In the specific area of the electricity sector, the proposal for a Cybersecurity Network Code for cross-border flows of electricity should also be highlighted. This code, provided for in Article 59 of Directive 2019/944 of 5 June 2019 on the internal market in electricity, and still to be adopted as a Commission delegated act (ACER submitted its proposal for a network code to the European Commission on 14 July 2022), should include, inter alia:

- A common framework for electric cybersecurity aimed at standardising the measures implemented to protect the EU's electricity system from a cybersecurity perspective.
- A governance framework for cybersecurity in the electricity system.
- A comprehensive cross-border risk management process.
- <sup>105</sup> - Cybersecurity Incident Management Rules.
- A framework for monitoring and reporting on cybersecurity in the European electricity system.

#### e) Objectives addressed

Strengthen capabilities for prevention, detection and response to cyber-attacks to ensure safe use of energy systems and associated networks and information systems.

#### f) Mechanisms for action

---

[Commission](#) Recommendation (EU) 2019/553 of 3 April 2019 on cybersecurity in the energy sector



- Incorporate the analysis of cybersecurity risks into the national legislation on the security of supply of hydrocarbons and electricity, with a particular focus on operators of essential services.
- Incorporate the analysis of cybersecurity risks into the Preventive Action Plans, Emergency Plans and Risk Assessment of electricity, gas and hydrocarbon systems.
- Conduct emergency simulation exercises on 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 related international initiatives.
- Include cybersecurity training as part of academic and professional training schemes related to energy management systems.

**g) Bodies responsible**

General State Administration, Autonomous Communities and local authorities.

To conclude, we would point out the close connection between the energy security dimension and the other dimensions addressed in this Plan:

- With the internal market dimension, it shares instruments such as electricity and gas interconnections or demand-side management.
- With R & I + c, as battery or power-to-gas developments depend on *the* cheaper deployment of these technologies, which will be key in the future for security of supply.
- As regards the decarbonisation dimension, the high penetration of renewables in the system poses challenges in their manageability, as well as their integration into the transmission and distribution networks.
- And with the energy efficiency dimension, as several of the solutions in this area, such as local energy networks, also contribute to the resilience of the system.

### 3.4. DIMENSION INTERNAL ENERGY MARKET

#### Regional co-operation

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, meetings have been held since 2019, whether bilateral or multilateral, with representatives of Portugal, France and the European Commission. Examples in this area are the cooperation initiatives developed in recent years with EU Member States:

1. Spanish-French cross-border cooperation strategy:

Negotiated in summer 2022. This includes a 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 promoting renewable energy as reflected in existing cross-border cooperation agreements, at territorial level. Three instruments are mentioned:

- a. The agreement between the regional community of Navarre and the French department of the AtlanticPyrenees<sup>106</sup>.
- b. The project “Promobiomasse”, already completed, involving Navarra, Catalonia, Aquitaine and Midi-Pyrénées (and Extremadura and Northern Portugal) is also mentioned.
- c. The EKATE project, a regional photovoltaic project between the Basque Country, Navarre,

---

<sup>106</sup> [https://www.boe.es/diario\\_boe/txt.php?id=BOE-A-2021-967](https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-967)

Catalonia, Occitania and Nouvelle-Aquitaine.

2. XIV Spanish-Portuguese Committee on Cross-Border Cooperation:

Meeting on 22 September 2022 in Porto. Some energy-related aspects were indicated.

- a. Create synergies in the different areas associated with the energy transition, strengthening regional cooperation, in particular in the field of renewable energy, bearing in mind not only decarbonisation objectives but also the role of the sector in boosting and boosting the economy.
- b. Advance the launch in Cáceres of the Iberian Centre for Energy Research and Storage, an example of Spanish-lusa collaboration, along the lines of the International Iberian Laboratory of Nanotechnology, and a pioneering project in the field of renewable energy, including the production and storage of green hydrogen and energy interconnections.
- c. Deepen joint economic development projects in the area of the next generation battery value chain, acting in an integrated way from the exploitation and refining of lithium to the production and recycling of batteries for the two main target markets: electric mobility and micro-smart *grids management*.

3. Memorandum of Understanding on cooperation in the field of renewable hydrogen between Spain and the Netherlands

Signed during the Madrid International Renewable Energy Conference (SPIREC) on 20 February 2023. In it, Spain and the Netherlands set up a framework to promote and enhance cooperation in the field of renewable hydrogen and its derivatives.

It was agreed to cooperate between the two countries in order to:

- a. Analyse the potential feasibility of renewable hydrogen corridors and certification schemes;
- b. Develop knowledge sharing on innovative renewable hydrogen technologies;
- c. Promote joint renewable hydrogen projects, creating new opportunities for businesses.

**Measures relating to the Dimension of the Internal Energy Market**

As regards the interconnectivity of the electricity system, work continues on what was agreed in the Madrid Declaration – Energy Interconnections Summit 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 electricity transmission activities was adopted and a new Regional High Level Group for South-Western Europe was set up to promote and monitor interconnection projects. This strategy has been endorsed in the Lisbon Declaration.

In the area of the Internal Market dimension, the main measures are described below.

### Measure 4.1. New electricity market design

#### a) Description

A reform of the European electricity market is being negotiated in the Council of the European Union, with the aim of increasing the resilience of the electricity market, reducing the volatility of final electricity prices, accelerating the penetration of renewable energies and shifting their low prices to final consumers.

#### b) Objectives addressed

Spain will hold the Presidency of the Council of the European Union in the second half of 2023 and will have as one of its priorities during its Presidency the approval of the 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 fair energy transition, ensuring affordable access to electricity for households, and incentivising the necessary investments in the electrification of our economy. In addition, competitive prices are essential to enable European industry to compete on a level playing field on international markets.

Second, the future market design should incentivise the necessary investments in renewables to meet decarbonisation objectives in the most efficient way. To this end, negotiations are ongoing to facilitate access to long-term contracts by removing market barriers to the development of PPAS and removing regulatory barriers to the development of CFDs, thus providing certainty for renewable energy investors.

Thirdly, to incentivise the necessary investments in technologies that provide the necessary flexibility to the electricity system to accommodate growing intermittent renewable production, various mechanisms are being considered to facilitate the development of technologies such as storage or demand response. Among these, capacity mechanisms will have to play a key role in security of supply, taking shape as markets with a strong structural character, and therefore a legislative amendment is being sought to speed up and facilitate their implementation at national level by the Member States. The development of these markets is included in Measure 4.3.

#### c) Mechanisms for action

Spain has been working proactively to push for a reform of the electricity market that enables the objectives of decarbonisation to be met in an efficient manner, guarantees the security of supply of the electricity system and enables all consumers to access electricity supply at a competitive and stable price. To this end, in the first half of 2023, Spain drew up a proposal to reform the electricity market, which it sent to the European Commission and organised working days bringing together the various actors 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 will hold the Presidency of the Council of the European Union, and will therefore work towards the consensus needed to approve the reform of the electricity market by the end of 2023.

#### d) Bodies responsible

MITECO

### Measure 4.2. Fight against energy poverty

#### a) Description

The Clean Energy for All Europeans package suggests tackling energy poverty from the roots, through targeted social policies and energy efficiency measures, such as the isolation of social housing.

It is also progressing that energy poverty is a major challenge across the EU and is rooted in low incomes 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.

As part of the Energy Union Governance process, Member States should assess the number of households in energy poverty in their integrated national energy and climate plans, taking into account the necessary domestic energy services to ensure basic living standards in the national context, existing social policy and other relevant policies, as well as the Commission's indicative guidance on relevant indicators, including geographical dispersion, based on a common approach to energy poverty. Where a Member State identifies a significant number of households in such a situation, it should include in its Plan an indicative national target for reducing it.

The integrated national energy and climate progress report should include:

1. Information on progress towards the national indicative target of reducing the number of households in energy poverty.
2. Quantitative information on the number of households in energy poverty and, where available, information on policies and measures to address the problem.

The Commission will share the data reported by Member States with the European Energy Poverty Observatory (EPOV).

In the national context, energy poverty in Spain is a complex phenomenon, the approximation of which calls for multidisciplinary analysis and coordinated action by public authorities on the various policies. The '**National Strategy against Energy Poverty' (ENPE)** adopted in April 2019 provides a framework for action and a framework for the actions to be taken in this area. To this end, it has adopted an approach combining measures of a more lenient and palliative nature, which are implemented in the short term, with other measures to improve energy efficiency, which are more structural and developmental, geared to the medium and long term. The Strategy has been drawn up within a framework for collaboration, advice and participation by representatives of bodies from the various administrations (State, Autonomous Community and local), as well as experts and entities from the third sector, who will also be present in its subsequent implementation.

In line with the European guidelines, ENPE includes a definition of energy poverty and vulnerable consumer poverty (*"Energy poverty is the situation in which a household in which basic needs for energy supplies cannot be met as a result of insufficient income and, where appropriate, may be aggravated by energy inefficient housing; Vulnerable consumer is the consumer of electricity or thermal uses who is in energy poverty and may benefit from the support measures put in place by the authorities"*).

In order to measure situations, ENPE selects the four official indicators of the European Energy Poverty Observatory (EPOV):

1. Disproportionate expenditure (2M): percentage of households whose energy expenditure in relation to their income is more than double the national median.
2. Hidden energy poverty (HEP): percentage of households whose absolute energy expenditure is less than half of the national median.
3. Inability to maintain the dwelling at an adequate temperature: percentage of the population unable to maintain their dwelling at an adequate temperature.
4. Late payment of invoices: percentage of population facing delays in paying bills for housing supplies.

In addition, the analyses of these indicators are supplemented by other derivatives and are cross-checked with certain population characterisation variables.

ENPE also sets a target for each of the EPOV indicators: reduce by at least 25 % by 2025, looking to go further and reach 50 % of its current values.

Through 4 key axes, the lines of action that materialise ENPE's operational plan, set out in 19 measures, are outlined. The axes on which ENPE is based are as follows:

#### 1. Improving awareness

Regular monitoring of the indicators through the annual update of the four indicators by the National Statistical Institute (INE), which will provide specific information on their values broken down by climate zone. IDAE, for its part, will be the body responsible for publishing the results and carrying out a comparative analysis with the other Member States of the European Union and with the objectives set at national level.

## 11. Improving the response to the current situation

The planned provision measures are key mechanisms for the short-term protection of vulnerable consumers, enabling them to cope with payments for their energy supplies.

The creation of a new energy social bond, based on disposable income criteria, is envisaged. The income thresholds to be set may be relaxed for certain categories of particularly vulnerable consumers, paying particular attention to households where there are children. Provision may be made for the direct award of aid to groups in receipt of benefits whose grant is linked in advance to low income levels.

The mechanism will follow three principles:

1. Universality of sources of supply: the new aid will be comprehensive for all energy supplies, both electric and thermal.
2. Automation: it will be simplified by direct verification of the requirements by a public administration that collects information from all the bodies involved, avoiding that the consumer has to process the application.
3. Coordinated management with other public administrations: all administrations will be involved in the implementation of the aid in a coordinated manner and in accordance with the division of powers established.

Social services will have to apply the precautionary principle associated with the Minimum Vital Supply so as to prevent the supply of the most vulnerable households from being interrupted for a period of time.

One of the measures envisaged will be a ban on interrupting energy supplies in extreme weather conditions to vulnerable consumers.

### 111. To create a structural change to reduce energy poverty

Structural and energy efficiency measures are included in this axis, focusing on improving the equipment and conditions of the buildings and households of vulnerable consumers.

They are a key element in tackling energy poverty because they seek a permanent change in households that reduces their dependency on other borrowing measures. This includes measures such as improving energy efficiency and residential equipment (Measures 2.6 and 2.7 of this Plan), as well as self-consumption facilities targeting vulnerable consumers (Measure 1.4).

### 112. Measures to protect consumers and raise social awareness.

These are actions that seek to empower consumers, professionals and other actors linked to energy poverty through better knowledge of rights, obligations, possibilities and alternatives in the field of energy consumption.

The first element is the general awareness of the need to eradicate energy poverty as an existing situation in society.

It also includes the development of a protocol to identify situations of energy poverty by primary care professionals.

ENPE states that it is necessary to draw up an **operational plan** in order to detail concrete actions to achieve the commitments to reduce the incidence by 2025. In response to this mandate, work is being carried out on the preparation of the **Operational Plan 2023-2024**, aimed at deploying the actions that remain to be implemented in the two-year period 2023-2024, detailing the steps needed to achieve the commitments set and within the established deadlines, and making the ENPE's strategic vocation effective as a key instrument for addressing the phenomenon of energy poverty in Spain from an integrated perspective and with a long-term perspective.

The preparation of the **Operational Plan 2023-2024** is based on an examination of the changes in the international and national context that have occurred since 2019, paying particular attention to the energy poverty impacts of the COVID-19 health emergency (2020-2021) and the energy price crisis aggravated by the invasion of Ukraine (2021-2022). The evolution of the four official energy poverty indicators for the period 2017-2021 and the path towards meeting the 2025 impact reduction targets should therefore be analysed in the light of these developments, which could not be predicted at the time of drafting and

approval of ENPE, and which have significantly altered the course of action of public administrations.

These substantial changes in the context have required a response in the form of urgent and short-term measures to address these exceptional situations and provide a higher level of protection to household energy consumers, especially vulnerable consumers, and to take the first steps towards more structural reforms in the energy market. Consequently, the objectives of this Operational Plan include taking stock of the structural and extraordinary support measures adopted between 2019 and 2022 in order to harmonise and coordinate the implementation of ENPE's measures in the two-year period 2023-2024 with the instruments already in place. Similarly, the aim is to identify other relevant policy instruments (in the form of strategies, plans, programmes, roadmaps and sectoral legislation) that work together or relate to ENPE's energy poverty reduction objectives, in order to improve administrative coordination and enhance possible synergies between the various government policies.

The Operational Plan will also help to incorporate new opportunities, such as the NextGenerationEU European funds, implemented through the Recovery and Resilience Facility (RRF), which have allowed measures under Axis III to have received additional budgetary allocations initially not foreseen by ENPE in 2019.

Over the last two years of the Strategy's implementation period, the 2023-2024 Operational Plan will, taking into account the new context, relaunch and reinforce the measures foreseen in ENPE. To this end, the state of development of the Strategy will be assessed by identifying the actions taken or launched until December 2022 and the actions to be taken in all 19 ENPE measures. On this basis, a detailed formulation and planning of actions necessary for the implementation of the measures will be carried out, including a timetable for the two-year period 2023-2024. The Operational Plan will also set out for each measure a set of impact and performance indicators, and will also define specific sources of verification that the actions making up each measure have been properly implemented. These elements will contribute to the final evaluation of the Operational Plan and the Strategy at the end of the implementation period in 2024. This final evaluation will also serve, together with the lessons learned in the 2019-2024 implementation period, as a basis for the development of a new **National Energy Poverty Strategy in place from 2025 onwards**.

In any case, and beyond the programme and strategy measures, the intense regulatory production carried out in recent years should be highlighted with the aim of addressing the phenomenon of energy poverty more effectively, by covering those groups in situations of energy vulnerability through different areas.

In particular, we highlight the creation of the so-called 'minimum vital supply' created by Royal Decree-Law 17/2021 of 14 September 2021 on urgent measures to mitigate the impact of the escalation of natural gas prices on the retail gas and electricity markets, and which is a social protection instrument against the energy poverty situation 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 may not be exceeded for a period of six months during which supply may not be interrupted, in accordance with the terms and conditions laid down by law.

Also, Royal Decree-Law 6/2022 of 29 March 2022 adopting urgent measures in the framework of the National Plan to respond to the economic and social consequences of the war in Ukraine introduced a number of modifications facilitating access to the electricity discount represented by the social voucher.

First, the income thresholds allowing access to the social bond were increased, so that this relaxation has allowed more people to access this discount on the invoice. Second, the concept of unity of cohabitation was introduced, replacing the family unit, giving greater recognition and coverage to the various cohabitation groups that are increasingly common. Thirdly, the automatic renewal of the social voucher was introduced, so that, with the same contours (income, social, etc.), the discount on the invoice involved in the social voucher is automatically renewed for another two-year period.

In short, previous measures have helped to strengthen the social protection shield for people in situations of energy vulnerability, in line with the commitments made in the National Strategy against Energy Poverty.

## b) Objectives addressed

The reduction of energy poverty in Spain and the reduction of the impact of this state on part of the population.

**Table 3.4. Energy poverty targets**

Indicator (%)	Minimum target for		Objective sought for 2025
	2021	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) Mechanisms for action

The National Strategy against Energy Poverty includes:

- **A diagnosis and characterisation of the problem.**

A definition of the situation of energy poverty and vulnerable consumer is articulated in line with the regulation set out in the Internal Electricity Market Directive and the Governance Regulation.

- **Official measurement indicators have been designed.**

This preliminary analysis has made it possible to identify the needs and places of action to be met by ENPE. The evolution of these indicators will be subject to continuous analysis and will serve as a basis for comparison with the other Member States of the European Union.

- Poverty reduction targets have been set in the medium and long term.

- Measures have been designed to achieve the objectives.

- **Implementation of the Plan + SE Plan More Energy Security**, which aims to increase security against the influence of energy prices on households and the economy as a whole. It includes objectives for the protection of the most vulnerable consumers.

In addition, the Operational Plan for the Strategy will be drawn up in which:

- Developments in the international and national context since 2019 will be examined.

- The evolution of the four official energy poverty indicators for the period 2017-2021 and the path towards meeting the 2025 impact reduction targets will be analysed.

- It will take stock of structural and extraordinary support measures taken between 2019 and 2022.

- The additional actions necessary for the implementation of the measures shall be established, including a timetable for the two-year period 2023-2024.

- Impact and performance indicators will be established on the development of the actions making up each measure.

- The basis for the next National Energy Poverty Strategy will be established.

Other mechanisms for action include improving knowledge of the phenomenon of energy poverty, with the aim of having an up-to-date system of indicators enabling the average consumption of a household to be determined and enabling households in energy poverty to be identified. To this end, the following studies have been or are being prepared:

- SPAHOUSEC III (in preparation): it consists of the latest update of the SPAHOUSEC study, which includes an updated analysis and data on the energy consumption of Spanish households by IDAE. In order to produce it, energy consumption data have been collected in a sample of households, using a system of electricity consumption measurements.

- Study to monitor energy poverty (under preparation): the aim of the study is to improve current knowledge of Spanish households in energy poverty, thus contributing to the design of effective measures to reduce energy poverty. To this end, measurements shall be made in a set of households in energy poverty. Specifically, this study responds to the requirement laid down in the National Strategy to Combat Energy Poverty 2019-2024 (ENPE), within one of the four strands of action through which it is structured – Axis I ‘Improving knowledge of energy poverty’.

**d) Bodies 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 for undertaking the transformation of the electricity system. This Plan includes a renewable target of 81 % in the electricity sector, which will require firmness on the part of the various generation mix technologies, with the aim of integrating renewable energy in an optimal way.

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 the security of electricity supply during the energy transition by incentivising investment in assets that give flexibility and firmness to the electricity system.

The proposal submitted for a hearing is based on a centralised purchase by the OS of capacity with different time horizons: a short-term auction (for the following year and annual contract) combined with a longer-term auction (both 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 resource adequacy assessment, to draw up a national adequacy assessment and other studies, following which the European Commission must issue a favourable opinion.

#### b) Objectives addressed

Implementation of a capacity market for the Spanish electricity system, which will act as a lever for the decarbonisation of the electricity system, the integration of renewables and the guarantee of supply.

#### c) Mechanisms for action

In order to implement this capacity market, it is necessary to draw up a series of studies and plans to be approved by the European Commission, including a national adequacy analysis, an implementation plan, and to approve an estimate of the Value of Loss Load (VOLL) for different consumer groups. Work is under way to draw up these plans and studies, with the aim of implementing a capacity market.

In addition, in the context of the reform of the European electricity market, included in Measure 4.1, Spain has tried to incorporate capacity markets as a structural element of market design, eliminating their temporary and last resort nature as currently established by Internal Market Regulation 2019/943, as well as facilitating and simplifying the approval process.

#### d) Bodies responsible

MITECO

## Measure 4.4. Increasing electricity interconnection in the Internal Market

### a) Description

#### A.1 Electrical interconnection with France

Spain's interconnection with France currently has a maximum commercial capacity of 2.800 MW (import from France).

The following essential interconnections are envisaged:

- Bay of Biscay project: Interconnection between Aquitaine (FR) and the Basque Country (ES). It will allow interconnection capacity between Spain and France to reach 5.000 MW.
- Interconnection between Aragón (ES) and *Atlantic Pyrenees* (FR) and interconnection between Navarra (ES) and Landes (FR). Increase interconnection capacity between Spain and France to 8.000 MW.

Interconnections are the main infrastructure element enabling progress in the internal energy market, as they enable the exchange of electricity with neighbouring countries, with 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 duplicate 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 Electrical 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 close cooperation between the governments of both countries. As a result, since its inception in July 2007, MIBEL has been one of the most liquid markets in Europe, bringing multiple benefits to consumers in both countries, within a framework of participation open to all stakeholders on an equal, transparent and objective basis.

At the Spain-Portugal border, the average congestion in recent years is around 5 %, and the average price difference between countries is lower than EUR 0,3/MWh. The biggest problems are detected in the north. The new interconnection already planned at this border will allow Portugal to reach the interconnection ratio target and allow full integration of the MIBEL in the short term.

Even so, the increase in capacity between Spain and Portugal to 3.000 MW is considered appropriate. The project was considered since the first establishment of the PCI list in 2013<sup>107</sup>, as well as in subsequent biennial updates and consists of the following facilities on the Spanish side, located in the provinces of Ourense and Pontevedra:

- Power line at 400 kV, DC, entering and leaving Beariz on the Cartelle-Mesón do Vento line.
- Transport substation Beariz at 400 kV.
- Power line at 400 kV, DC, Beariz-Fontefría.
- Transport substation Fontefría 400 kV.
- Power line at 400 kV, DC, Fontefría-Portuguese border.

### b) Impact of the measure

Interconnections are the building blocks for progress in the internal energy market, as they make it possible to exchange electricity with neighbouring countries, with competitive and homogeneous prices.

<sup>7</sup> Commission Delegated 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.

they reduce the volatility of national markets. 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 duplicate 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 PCI list in 2013<sup>108</sup>, 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 underwater, with an estimated cost of around EUR 2.400 million. This project will allow interconnection capacity between Spain and France to reach 5.000 MW. This project is expected to obtain the necessary permits on both sides of the border to start construction before the end of 2023.

As for the others, they are also included from the PCI list 2021<sup>109</sup> and the details are as follows:

- Interconnection between Aragon (ES) and *Atlantic Pyrenees* (FR). It has 150 km planned on the Spanish side.
- Interconnection between Navarre (ES) and Landes (FR.) It has 80 km planned on the side.

These projects are currently still in the definition phase and are expected to be put into service in 2030.

## c) Bodies responsible

### C.1 Electrical interconnection with France

The public authority responsible for approving and monitoring the measure is MITECO, in collaboration with the French Government. The implementation is carried out by REE together with the electricity operator in France, RTE.

### C.2 Electrical interconnection with Portugal

The public authority responsible for the approval and follow-up of the measure is MITECO in collaboration with the Government of Portugal. The execution is carried out by REE together with the electricity operator in Portugal, REN.

## d) Sectors addressed

This measure is aimed at the electricity sector.

## e) Mechanisms for action

### E.1 Electrical interconnection with France

The transport network planning in force, with the 2021-2026 horizon, provides for the Bay of Biscay interconnection with France by 2026, with an estimated commissioning by the end of 2028. The planning also covers the interconnections between Aragon (ES) and Atlantic Pyrenees (FR) and interconnection between Navarre (ES) and Landes (FR) after 2026.

### E.2 Electrical interconnection with Portugal

The current transmission network planning, with the 2021-2026 horizon, provides for this international interconnection between Spain and Portugal. The various projects at present

<sup>8</sup> Commission Delegated 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. 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.

<sup>9</sup> 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 covered by this interconnection have already obtained prior administrative authorisation and are expected to be granted by the Council of Ministers in the near future with the administrative authorisation for construction.

## f) Financial needs and public support

### F.1 Electrical interconnection with France

The *Connecting Europe Facilities* (CEF) programme established by Regulation (EU) No 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 financing electricity interconnections (Measures 4.1 and 4.2), as well as in the other CIP infrastructure. 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, with the approval of each Member State.

In relation to the Bay of Biscay project, the promoters of the project (REE and RTE) requested EUR 800 million of CEF funds in the 2017 call. The call was closed at the beginning of 2018 with the award of EUR 578 million. According to the cost allocation referred to above, 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 cost sharing between the two countries that will be governed by the coordinated decision of CNMC and CRE of September 2017, as amended in the terms agreed last March 2023.

## **F.2 Electrical interconnection with Portugal**

This new interconnection with Portugal, which is also included in the PCI lists, has an estimated cost of EUR 128 million.

It is estimated that it will enter into service in 2024-2025, increasing the capacity to exchange with Portugal, reaching values of 4.200 MW from Spain to Portugal and 3.500 MW from Portugal to Spain.

### Measure 4.5. Electricity Transmission Network Development Plan 2021-2026

#### a) Description

As stated above, the Energy Planning Document, the 2021-2026 Electricity Transmission Network Development Plan, is currently in force.

The planning process is a regulated process open to the participation of the company, which started in March 2019 by means of Order TEC/212/2019 of 25 February, which initiates the procedure for making proposals for the development of the electricity transmission network by 2026. At the proposal stage to the 2021-2026 planning process, a total of 1.335 proposals were received from 177 subjects.

On the basis of the information obtained, the Study Phase was launched by Red Eléctrica de España (REE) in its capacity as System Operator. The Comisión Nacional de los Mercados y la Competencia (CNMC) drew up a report with 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.

Between 15 February and 12 April 2021, the submission phase of the Proposal for the Development of the Transport Network 2021-2026 took place. It is launched simultaneously with the public consultation of the Strategic Environmental Study.

In a second phase of studies, MITECO passed on all the considerations received to the System Operator, who drew up the proposal for the development of the transport network on 23 June 2021.

Finally, the 2021-2026 Electricity Transport Network Development Plan was submitted to the Council of Ministers, which was approved on 22 March 2022 by an Agreement of the Council of Ministers and published by the Resolution of the State Secretariat for Energy of 8 April 2022.

As far as the binding planning is concerned, it includes the electricity transmission network infrastructure necessary 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. The integration of renewables is permitted 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 and island systems.
- d) Development of international interconnections.
- e) Feeding of new high-speed train axes.
- f) Support for the distribution network and new demand from large consumers.

The development of actions that may affect neighbouring electricity systems shall be carried out in cooperation with the relevant TSOs in order to minimise the possible effects and impacts on both electricity systems.

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 on 300 km of existing lines and the novel deployment of dynamic line transmission capacity monitoring systems.

The planning of new lines covers 2.681 km of new axles and 733 km of traces for submarine cables.

As regards the Balearic electricity system, the links proposed result in 65 % of the Balearic electricity supply being served from the mainland.

In the Canary Islands' electricity systems, the planned transmission system substantially improves security of supply and, through greater integration of renewables, cooperates in reducing variable generation costs.

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, the guiding principles for the planning of the electricity transmission network 2021-2026 are, in addition to the general principles laid down in Article 9 of Royal Decree 1955/2000 of 1 December regulating the transmission, distribution, marketing, supply and authorisation procedures for electricity installations, those set out in Order TEC/212/2019 of 25 February, which initiated the procedure for making proposals for the development of the electricity transmission network with a 2026 horizon:

1. The implementation of the energy and climate commitments contained in this Plan.

2. Maximising renewable penetration of the electricity system, minimising the risk of spills, and in a manner compatible with the safety of the electricity system.
3. The evacuation of renewable energy in areas where there are high renewable resources and where it is environmentally possible to operate and transport the energy generated.
4. The contribution, as regards the electricity transmission system, to ensuring the security of supply of the electricity system.
5. The 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 restrictions in the electricity transmission network.
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, renovating, expanding capacity, using new technologies and reusing the uses of existing installations.
9. The reduction of losses for the transport of electricity to consumption centres.

#### **b) Impact of the measure**

Traditionally, the planning of the electricity transmission network consists of a binding part, the grid infrastructures to be built, and an indicative part with demand and generation projections. On this occasion the indicative part is the present NECP. The binding planning of the electricity transmission network will therefore be adapted to meet the objectives of this Plan and its forecast demand and generation park.

The energy transition process requires adequate planning of the electricity transmission network to enable mass integration of new renewable generation at the pace necessary to achieve the objectives in the medium and long term, ensuring secure operation of the electricity system at the lowest cost to consumers. In this regard, the proper design and planning of the system plays an essential role in integrating a larger amount of intermittent electricity generation, enabling more generation to be connected. It is also expected that distributed generation from renewable sources and self-consumption will become increasingly important over the coming years.

In addition, the transformation of the energy model will entail a change in the generation mix as a result of the replacement of emitting and polluting 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 upgrading the existing network over new routes and infrastructure. These actions may be carried out by increasing the capacity of the network through repowering and laying multiple circuits and using new technologies. This shall be done by prioritising the necessary security of supply and reliability of the electricity transmission network at all times.

It should also be stressed that network planning includes among its objectives the removal of structural technical constraints that cause economic inefficiencies in the system and an additional cost in the energy price paid by consumers, as well as minimising losses caused by long-distance energy flows to supply large consumption centres.

Lastly, it should be pointed out that energy is an important factor in the location of economic activity, so planning must provide an adequate response to the needs for new demand identified, including those resulting from the development of high-speed rail infrastructure, thus contributing to the creation of wealth, employment and the backbone of the region.

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 corresponds 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 subject to investment limits in accordance with sectoral legislation.

#### **c) Bodies responsible**

The public authority responsible for approving and monitoring the measure is MITECO. Implementation is

carried out by the TSO, EER.

**d) Sectors addressed**

This measure is aimed at the electricity sector.

**e) Mechanisms for action**

The development of the future transmission network in line with the binding planning set out in the 2021-2026 Electricity Transmission Network Development Plan, taking into account the guiding principles set out in Order TEC/212/2019 and indicative, which is fully reflected in this NECP. The future transmission network design aims to enable mass integration of new renewable generation, eliminating the structural constraints of the grid, meeting the needs of international interconnection and connection of non-peninsular territories, while maintaining and improving the security of supply of the Spanish electricity system.

**f) Financial needs and public support**

The proposal for the development of the transmission network must comply with the principles set out in the aforementioned Law 24/2013 of 26 December 2007, including the economic and financial sustainability of the electricity system provided for in Article 13 of the aforementioned Law, in any case respecting the annual investment limits established by Royal Decree 1047/2013 of 27 December 2003, which establishes the methodology for calculating the remuneration for the activity of transporting electricity.

## Measure 4.6. Integration of the electricity market

### a) Description

Progress in electricity market integration consists of a number of initiatives detailed below.

1. Further progress will be made in 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 necessary to achieve the 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 operation procedure 3.11) will be crucial to achieve those decarbonisation objectives.
2. Take the necessary measures to boost the decarbonisation of the economy with the aim that fossil fuel power plants minimise their contribution to the electricity system by 2030.
3. Take the necessary measures to improve the manageability of hydropower, thereby maximising the integration of renewable energy (this measure is complemented by the measure to increase electricity storage, within the energy security dimension).
4. Encourage consumer participation in the electricity market. The European internal market directive and regulation provide incentives for demand response and, in application of these rules, the market will evolve towards a design that provides effective price signals through which the active participation 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 demand participation in balancing services, providing demand-side flexibility that contributes to both security of supply and the achievement of decarbonisation objectives.
5. Complete the capacity market approval process, as a capacity mechanism provided for in Regulation 2019/943 of 5 June 2019 on the internal electricity market, contributing to the achievement of the objectives of this Plan, open to the participation of all resources that are able to provide the necessary capacity, including the management of energy storage and demand.
6. Continue to boost self-consumption and distributed generation (Measure 1.6). In this regard, Royal Decree 244/2019 of 5 April 2007 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 that this legislation partly transposed the provisions of the Renewable Energy Directive.

It also regulates **collective self-consumption**, enabling a number of consumers (from a community of owners, a neighbourhood, an industrial estate, etc.) to benefit collectively from the same nearby generation facilities located in their surroundings, leading to better use of generation capacity and, therefore, of the investment to be made.

7. In this regard, the development of the Energy Communities (Renewable Energy Communities and Citizens' Energy Communities) will be crucial to enable new vehicles for public participation in self-consumption activities, contributing to consumer empowerment and facilitating demand flexibility, which are essential for achieving the decarbonisation objectives committed by the Kingdom of Spain. Further development, in line with the Directive and Regulation on the internal market, of energy storage as a means of securing electricity supply, shall be considered to be capable of offering multiple services with different characteristics and advantages. Thus, generation, demand and storage will be able to provide firmness and flexibility, with appropriate mechanisms, ensuring supply at all times (see Measure 1.5 and Measure 1.6).
8. Demand management and flexibility (Measure 1.5) also contribute to the integration of the electricity market through active demand response initiatives. In this regard, Royal Decree-Law 17/2022 of 20 September 2007 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 the increased participation of demand.
9. In turn, and as stated in Measure 1.24 'Citizenship at the centre', in order to promote a proactive role for citizens in decarbonisation, regulatory changes at Spanish and European level and technological development encourage citizens to move from passive consumers to actors and producers and can also participate in demand 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, as well as 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 the considerable effort made by Spain in the roll-out of smart meters, which began in 2008 and was completed at the end of 2018, consumers have a basic tool for knowing their hourly consumption, becoming active consumers and being able to adjust to electricity market prices. Thus, consumers can adjust their demand to times when market prices are lower, thereby contributing to the shift of the demand curve and thereby facilitating a decrease in electricity prices.

In this regard, it is essential to continue to make progress on a favourable enabling framework for the promotion of self-consumption and renewable energy communities. In this regard, the provisions of Royal Decree-Law 15/2018, of 5 October, on urgent measures for the energy transition and consumer protection have been developed through Royal Decree 244/2019 of 5 April 2007 regulating the administrative, technical and economic conditions for self-consumption of electricity, with the premise of seeking the greatest possible simplicity in the technical and administrative requirements, so that they do not constitute a barrier to the development of self-consumption.

Subsequently, successive amendments have been made to incorporate regulatory improvements that would allow greater use to be made of the renewable resource. For example, Royal Decree-Law 14/2022 of 1 August 2013 on economic sustainability measures in the field of transport, grants and study aid, as well as measures to save, energy efficiency and reduce energy dependence on natural gas, which included a late-off discount system in the activation of self-consumption, or Royal Decree-Law 20/2022, of 27 December, on measures to respond to the economic and social consequences of the war of Ukraine and to support the reconstruction of the island of La Palma and other vulnerable situations, allowing local self-consumption to be extended under certain circumstances.

Royal Decree-Law 15/2018 of 5 October 2009 abolished the role of charging manager and liberalised charging activity, enabling any consumer to provide recharging services. In addition, managers of ports, airports and railway infrastructure, as consumers, will be able to 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 such facilities, which contributes to the objective of low emission transport. The new regulatory framework linked to recharging points is currently Royal Decree 184/2022 of 8 March regulating the activity of providing energy recharging services for electric vehicles.

Furthermore, Royal Decree-Law 15/2018 of 5 October 2009 amended the regulation of self-consumption in Spain in order to enable consumers and producers, and society as a whole, to benefit from the benefits of this activity, in terms of reduced network needs, greater energy independence and lower greenhouse gas emissions.

In addition, progress should be made on a favourable framework for adequate consumer access to consumption data, such as the promotion of self-consumption and local energy communities, as set 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 in the centre, included in this Plan.

#### **c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure are MITECO and the Autonomous Communities.

#### **d) Sectors addressed**

This measure is aimed at the electricity sector.

#### **e) Mechanisms for action**

- **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 system should also continue to be highlighted. The incorporation of renewable energy production facilities into the national electricity system may, as a collateral effect, lead 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. That is why, while strengthening the commitments set out above to integrate renewables,

the necessary accompanying instruments must be put in place to ensure another major pillar of the national electricity system, namely security of supply. The capacity market proposed in the draft order is established as a centralised system whereby the system operator (OS), Red Eléctrica de España, S.A., will contract the firm power needs (in MW) identified in the demand adequacy analyses.

Although the procedure for this legislation began in 2021, the obligation to comply with all the requirements laid down in the Regulation (development of an implementation plan, a national resource adequacy 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 Road Sheet**

The Road Map for Self-Consumption sets out 37 measures to raise awareness and raise awareness of self-consumption among the population as a whole. 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 basis for aid for self-consumption and renewable thermal energy, managed regionally by the Autonomous Communities and cities of Ceuta and Melilla. Its 6 programmes are intended for self-consumption plants using renewable energy sources by all economic sectors, as well as the possibility of direct investments by the Autonomous Communities.

- **Third-party management or an energy service model**

In this model, companies specialising in energy services, such as electricity companies, undertake investment in self-consumption facilities and maintain them, selling energy produced under favourable conditions to consumers. This prevents the consumer company, family or administration from having to make the investment or take responsibility for an activity that is external to them.

#### Measure 4.7. Protecting electricity consumers and increasing competition

##### a) Description

The Energy Union has placed the electricity consumer at the centre of its policies. Energy is a critical asset, 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 EU consumers will have the right to generate electricity either for their own consumption, to store it, to share it, or to sell it to the market. These changes will make it easier for households to get involved in the energy system, to better control their consumption and to respond to price signals. The new market rules will ensure a high level of data 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) Mechanisms for action

This measure is considered in the specific aspect 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 promoting 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 smart tariff designs that promote demand management, rational use of infrastructure and contribute to decarbonisation objectives will be considered.
2. Facilitate the understanding of tenders and the conditions under which supply contracts are carried out, enabling them to make better choices regarding their electricity consumption, achieving more efficient behaviour and less harmful impact on the environment.
3. Step up the promotion of free competition between electricity traders.
4. Implementation of the Plan + SE Plan More Energy Security, which seeks more certainty against 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 replacement with renewables
- Strengthening strategic and energy autonomy
- Solidarity with other Member States

**c) Bodies responsible**

The public authorities responsible for the implementation and monitoring of the measure are MITECO, together with the Autonomous Communities and CNMC.

**d) Sectors addressed**

This measure is aimed at the electricity sector.

**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 on their energy consumption, as well as on the selection of more efficient tariffs and investments, and for existing or new players, such as aggregators, to offer them different energy services and perform the functions for which they are empowered by Directive (EU) 2019/944 concerning common rules for the internal market in electricity. Furthermore, the availability of information on aggregated consumption by public administrations is necessary to enable them to assess the effectiveness of energy policies and measures.

Following the deployment of smart metering systems for electricity consumption (which were already in place at 93 % in Spain in 2018), different data management models currently exist in the Member States or are being developed. For example, a central data platform, managed by an independent body, has already been established in Estonia and Denmark, with another option being that the operator of the platform is the distribution network operators themselves. Regardless of the management model, it is important that transparent rules are in place under which they can be accessed under non-discriminatory conditions and ensure the highest level of accessibility, usability, cybersecurity and protection, as well as the impartiality of the entities that process them.

The European Commission recently adopted an implementing act on interoperability requirements and transparent and non-discriminatory procedures for access to electricity consumption and measurement data, Implementing Regulation of 6.6.2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data C (2023) 3477, which aims to increase the protection of electricity consumers and their empowerment through digitalisation 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 the measurement and consumption data in the EU are governed by uniform principles and criteria.

**b) Objectives addressed**

To raise awareness and the leading role of citizens in the energy transition, the development of innovative energy services such as, inter alia, aggregation, and the analysis of the effectiveness of policies and support measures by the public administration, through appropriate access to electricity consumption data.

**c) Mechanisms for action**

Once the European Commission's implementing regulation on interoperability has been adopted, internal regulatory provisions will be adapted where necessary to bring them into line with the European regulatory framework. It shall be proposed that the data access platform be set up to make use of, as a minimum, those of existing meters, and to ensure:

- The simplicity of use for citizens both for consulting their consumption data and for authorising access to third parties.
- Compliance with data protection rules.
- Access to them in near real time and historical consumption.
- Administration's access to aggregated data by geographical scope and typology consumer.
- Relevant consumer information 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 the data and evolution of the electricity meter system was held in September 2020.

**d) Bodies responsible**

General State Administration (MITECO/IDAE, MINECO and the Ministry of Consumer Affairs), CNMC, REE and distribution companies.

As regards the Spanish gas market, its consolidation and development is considered to be a necessary element in the next decade, requiring the following initiatives: However, this development must be framed within the current framework for the decarbonisation of 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 focusing on the gas sector, the following initiatives are proposed to improve market integration:

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 2006 establishing the methodology and conditions for access and allocation of capacity in the natural gas system. This Circular allows LNG to be bought and sold without distinction from the plant in which it is physically located, making it possible to maximise the use of existing infrastructure with a view to contributing to energy solidarity throughout the EU (referred to in the More Energy Security Plan).
2. Increase of interconnection capacity. In 2022, the expansion of the Irún compression station increased the capacity of the interconnection by 2,5 bcm/year, thus increasing total export capacity to France to 8,5 bcm/year. In addition, the use of the “virtual pipeline” between Spain and Italy using small methaners will be encouraged, as well as the commitment to ship loading and natural gas bunkering services at Spanish regasification plants.
3. Launch of El Musel regasification plant in Gijón. This plant will serve to provide logistical services that will contribute to European energy solidarity while giving additional flexibility to the Spanish gas system.
4. Optimisation of liquefied natural gas (LNG) storage capacity at Spanish plants, as well as its regasification capacity, in order to be able to convert the Spanish gas system into a physical ‘hub’ at EU level, both for natural gas and for renewable gas or hydrogen. To this end, the use of the single tank, or virtual balancing tank (TVB), which was introduced by Circular 8/2019 of the National Commission on Markets and Competition of 12 December, will be encouraged. Since 2022, products have also been traded in the virtual tank and in virtual storage, although their liquidity is low. Moreover, since 2018 Mibgas Derivatives has also been contracting market maker services for forward products.
5. Maintenance of liquidity promotion measures in MIBGAS (increase in trading on the organised natural gas market) by means of both mandatory and voluntary market makers at MIBGAS’s Virtual Balance Sheet Point, in order to increase the attractiveness of the Spanish gas system for large international operators.

It should be noted that MIBGAS has been gaining weight in recent years, especially in the case of products delivered up to the following month (short term) at the virtual balance sheet 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, these increased from 7.5 TWh to 8.1 TWh in the same period of time.

##### b) Impact of the measure

This measure will be implemented by the national regulatory authority and, within the scope of its powers, by the CNMC, as well as within the framework of Law 8/2015 of 21 May. This law created the organised gas market (MIBGAS) and designated the market operator, with the aim of making up for the absence of an organised secondary wholesale market, which would provide a transparent price signal and encourage the growth of competition in the sector.

As for the electricity market, for gas it is also proposed to facilitate the entry of new traders and to reduce the administrative burden on natural gas traders in their dealings with the administration.

##### c) Responsible

The public authority responsible for the implementation and monitoring of the measure is MITECO.

**d) Sectors addressed**

This measure targets the gas sector.

### Measure 4.10. Protection of gas consumers and demand-side management

#### a) Description

With regard to consumer protection, in response to the overall objective of providing sufficient protection for consumers in relation to their supply, as well as the information needed to enable them to make their decisions on the consumption of natural gas in full independence, the following initiatives are proposed:

1. Smart metering deployment: on the basis of the cost-benefit analysis carried out by the CNMC in compliance with the fourth additional provision of Order ETU/1283/2017 of 22 December 2007 and in compliance with Article 14 of Royal Decree-Law 18/2022 of 18 October 2007, draw up a Ministerial Order setting out the development plans for the deployment of smart meters for natural gas and their minimum specifications.
2. Speeding up the process of changing marketers: measure directly linked to the previous one, since the introduction of meters with telemetering capacity significantly reduces the time needed, also introducing a procedure that prevents any delay and extending the powers of control by the regulator, by amending Articles 43 and 44 of Royal Decree 1434/2002.
3. Speeding up the connections: introducing the possibility for the applicant to implement it himself, by amending Article 25 of Royal Decree 1434/2002.
4. Reducing fraud: strengthen the role of distributors in detecting fraud and communication procedures to retailers 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 fraud detection capability and the agility that makes it possible to act on them.
5. Prevent supply from being suspended in extreme weather conditions, as set out in the National Strategy against Energy Poverty 2019-2024.

In this respect, it should be noted that, as a result of the high prices, volatilities and uncertainties experienced by the 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 2007, and the extension of that tariff to owners' associations which, because of their combined consumption, exceeded the maximum 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, contains 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 an extreme risk to security 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 possible disruption to unprotected customers.
7. Finally, Royal Decree-Law 18/2022 of 19 October 2007 established a maximum penalty for the termination of a natural gas contract before the expiry of the contract, as well as the obligation to terminate additional services contracted by household consumers at the end of their contract, unless the consumer expressly indicates otherwise.

In addition, the thermal social bond has been reinforced on several occasions, either by increasing the coverage or the minimum aid per beneficiary, all 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 volumes of gas consumed and their environmental footprint (emissions, share of renewable gas consumed, real time consumption, *online* billing query, etc.), as well as planning in the event of natural gas supply, recommending the interruption of supply to unprotected firm customers, in line with the European Commission's Communication "Shoring gas for a safe winter" of 20 July 2022 for the various industrial and economic sectors that consume natural gas.

**c) Responsible**

The public authority responsible for the implementation and monitoring of the measure is MITECO.

**d) Sectors addressed**

This measure targets the gas sector.

**Measure 4.11. Improving the competitiveness of the retail gas sector****a) Description**

The following initiatives are proposed:

1. New obligations for dominant operators in the natural gas sector based on their retail market share.
2. Creation of a single statistical referral point by traders to the General State Administration, centralised in the State Secretariat for Energy, which in turn provides information to other bodies that need it (CNMC, CORES).
3. Speed up the electronic procedure for registering new traders.

In that regard, it is worth recalling the effect of measures such as those contained in Royal Decree-Law 15/2018, consisting of the introduction of an exemption from the special tax on hydrocarbons for energy products used in the production of electricity in power plants or the cogeneration of electricity and heat in combined power 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 check, etc.)*.

**c) Bodies responsible**

The public authority responsible for the implementation and monitoring of the measure is MITECO.

**d) Sectors addressed**

This measure targets the gas sector.



**Measure 4.12. Iberian Hydrogen Corridor. H2MED****a) Description**

The Iberian Peninsula has great potential for the production of green hydrogen produced by hydrolysis from renewable electricity. The H2MED project aims to connect green hydrogen production sites in the Iberian Peninsula to domestic hydrogen demand, both in the Iberian Peninsula and in central Europe.

Driven by the governments of Spain, Portugal and France, the H2Med includes two cross-border infrastructures, one between Celorico da Beira (Portugal) and Zamora, and the other, underwater, between Barcelona and Marseille (France). It also includes a axis that will flow through the Cantabrian Sea, north-east and Mediterranean coast, and another through the west and south of the country.

These projects have been presented by the promoters as candidates for projects of common interest for the European internal market (PCI), as they are seen as reinforcing and facilitating international infrastructure.

**b) Impact of the measure**

This measure will enable Spain to become the world's first renewable hydrogen hub, incorporating the first hubs of the national backbone network that will connect green hydrogen production sites with domestic demand and with the two international interconnections with France and Portugal.

**c) Responsible**

MITECO and CNMC within the scope of their competences.

**d) Sectors addressed.**

This measure targets the renewable gas sector.

### Measure 4.13 Local electricity markets

#### a) Description

Local electricity markets seek to provide flexibility solutions for the operation of the distribution system, which will make it possible to resolve one-off or persistent congestions. The theoretical operation for this type of project, defined in projects such as the IREMEL project, responds to the functioning of the current day-ahead and intraday markets, using the price signal to encourage distributed energy resources to provide flexibility services to DSOs, in a competitive environment and under market conditions. Participation in these local markets would in any case be complementary to the participation that this type of distributed energy resources could have in existing markets and services.

Participation in the different markets would be conditioned by the state of the network at any given time: in the absence of congestion, they could participate in existing markets; in the event of occasional congestion, local products differentiated by area could be created, while in the case of persistent congestions requiring resources with a commitment to act, both local products and ex-ante contracting by the distributor of flexibility services could be envisaged.

Such markets can be a way of optimising the functioning of the electricity system as a whole, facilitating the penetration of distributed energy resources and transposing the Internal Electricity Market Directive, Article 32 of which promotes the definition of flexibility services as an alternative to the current way of operating the distribution system, based on grid reinforcements. In addition, they provide a possibility to introduce the price signal in areas where electricity is currently not traded in 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 of distribution system operators of energy resources connected to the distribution network in their area of influence, as well as to increase the visibility of distribution system owners and investors of the situation of occasional and persistent congestion at distribution network level.

#### b) Sectors addressed

This measure affects both distribution system operators and distributed energy service operators.

#### c) Mechanisms for action

The development of this type of local market meets the requirements described in Royal Decree 568/2022 of 11 July 2022 establishing the general framework of the regulatory test bank to promote research and innovation in the electricity sector. Furthermore, in order to be implemented, Circular 6/2019 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 also receive remuneration for the purchase of flexibility services, and not just physical assets.

#### d) Bodies responsible

MITECO, IDAE, CNMC, REE, Distribution System Operators.

## 3.5. DIMENSION RESEARCH, INNOVATION AND COMPETITIVENESS

R & D & I and industry should be at the heart of the initiatives and approaches proposed by the national public and private sectors to address the challenges of national strategic sectors in specific areas that are key for knowledge transfer and promotion of R & D & I in the Spanish business fabric. Among the national strategic sectors prioritised in EECTI are Strategic Climate Action, Energy and Mobility. 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, economic and environmental development are key in the strategic steering of state and regional funding plans and programmes.

The State Plan for Scientific and Technical Research and Innovation 2021-2023 (PEICTI), which articulates and develops the 2021-2027 EECTI at State level, also includes a Strategic Action in Climate, Energy and Mobility, allocating appropriate instruments to concentrate and coordinate a volume of funding for R & D & I in these areas. This strategic action will use instruments whose evaluation criteria are based on excellence in order to generate a knowledge-based economy.

On the other hand, as regards the environmental assessment of the NECP, the Strategic Environmental Study establishes as a cross-cutting strategic measure the incorporation of lines of research into environmental matters that improve the environmental integration of the measures in the NECP by encouraging the sector to work together with universities, businesses and scientific centres. Specifically, in the environmental field of the NECP, R & I measures will be promoted that maximise the environmental sustainability of installations, prioritising the minimisation of water use and the reduction of land use.

### **3.5.1. Policies and measures to achieve national targets**

The measures included in this section, which are framed by the principles and objectives of EECTI and the PEICTI, will contribute to a comprehensive and systemic response conducive to the adequate achievement of the objectives set out in this Plan in the research and innovation dimension of the whole energy and climate value chain.

The MCIN will be responsible for developing these measures in coordination with MITECO and other ministerial departments, together with its agencies and affiliated bodies. In addition, in order to avoid duplication and improve their effectiveness and efficiency, coordination with the Autonomous Communities and Local Authorities will be sought, as well as articulation with EU programmes and other international cooperation programmes.

### Measure 5.1. Strategic action in 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 political priorities of the European Union by aligning with its R & D & I programmes and addressing the challenges of national strategic sectors through R & D & I, to the benefit of the social, economic, industrial and environmental development of our country.

To this end, the EECTI defines a number of **strategic lines** in priority sectors and major driving projects, including climate, **energy and mobility**. Strategic actions in this area focus on the following sectors:

- **Climate Change and Decarbonisation:** Hydrogen and renewable synthetic fuels; Renewables; Batteries; Recycling techniques; New materials for generation and energy storage systems; Sustainable energy conversion and storage schemes for CO<sub>2</sub>; New methods for estimating economic damage caused by climate change; Turning points in the climate change economy; Impact of natural disasters on local economies.
- **Sustainable mobility:** Catalysis for more efficient fuels; Efficient vehicles (hybrid, electric, fuel cell, hydrogen); Innovation in rail, air and maritime transport; Sensory (sensors and biosensors) with mobility and transport applications.
- **Sustainable cities and ecosystems:** Clean and smart cities and territories; Efficient construction and climate systems; Clean manufacturing techniques; Techniques for the preservation of the environment; Maritime engineering (coasts, coastlines, estuaries); New building materials compatible with environmental protection.

In the 2021-2023 PEICTI, the strategic lines defined in the Strategy are developed through **strategic actions (IA)**, which are programmatic actions that channel sectoral policies towards the strategic lines defined and which constitute the areas of national smart specialisation. Strategic actions include the **EA on Climate, Energy and Mobility**, which is developed in the three strands identified in the Strategy (climate change and decarbonisation; sustainable mobility; sustainable cities and ecosystems) and adds a fourth strand, the energy transition.

#### b) Objectives

- Allow available resources to reach maximum cross-sector penetration, fostering rapid growth that improves competitiveness and impact in strategic areas for the country, including energy, climate and sustainable mobility.
- Contribute to the energy, climate and mobility objectives of national and regional smart specialisation strategies, avoiding duplication and encouraging the exchange of knowledge between the various actors involved.
- Supporting the industrial transition by facilitating HR empowerment, diversification of the economy, entrepreneurship and technological improvement of SMEs interested in promoting a technological shift towards a low-carbon economy.
- Increase returns from European energy and climate change programmes, by aligning national priorities with the EU's strategic lines.

#### c) Mechanisms for action

- The governance mechanisms of SECTI will ensure that priority areas are maintained and updated within the strategic lines, in particular energy and climate.
- Within the strategic lines, “programmatic actions” will be defined, with different forms of participation and financing instruments, which are articulated through the resources identified in the sectoral strategies, which may be managed by separate units, both within the MCIN and in other ministerial departments. In particular, the actions in the Climate, Energy and Mobility EA will be aligned with the measures set out in this Plan, as well as the Long-Term Decarbonisation Strategy (EDPL) 2050110, the PNACC 2021-2030, the Secure, Sustainable111 and Connected Mobility Strategy 2030 and other

---

The PEICTI2021-2023110 identifies the creation of networks for exchange, collaboration and coordination between research staff and the different actors in climate science and adaptation to climate change, support for the participation of Spanish research staff in the IPCC and support for projects of methodologies and tools for estimating the risks of climate change as specific lines of action under the PNACC.

Specific actions managed by MITMA111 are included, such as: networking, creation of the mobility innovation hub

strategies and roadmaps linked to the energy transition, including the Renewable Hydrogen Roadmap, the Roadmap for self-consumption and others in specific sectors such as the 'Roadmap for the development of the Marine Wind and Marine Energy in Spain' and the 'Biogás Roadmap' and the 'Energy Storage Strategy'.

- Coordination and complementarity will be sought with other strategic lines related to cross-cutting technologies with potential applications in energy transition, such as the measures included in the National Green Algorites Programme in the framework of the promotion of Artificial Intelligence.
- Spanish strategic priorities, and in particular energy and climate priorities, will be taken into account in the definition of concrete support instruments, such as those aimed at catalysing innovation and business leadership (e.g. the Science and Innovation Missions Programme or CERVERA support (both managed by the CDTI) or aimed at coordinating regional R & D & I capacities such as the Complementary Plans with ACs.

#### d) Responsible

MCIN, in collaboration with other related ministerial departments.

### Measure 5.2. Implementation of the SET-Plan

#### a) Description

The objective of the SET-Plan is to accelerate the development and deployment of low-carbon technologies<sup>112</sup> to achieve European energy policy objectives.

In the framework of the SET-Plan, the MCIN and its dependent bodies CIEMAT and CDTI, in coordination with MITECO, work in groups addressing R & I & c needs in: solar PV, concentrated solar, wind, geothermal, ocean technologies, carbon capture, storage and use, alternative bioenergy and renewable fuels, batteries, new materials and technologies for energy efficiency in buildings, energy efficiency in industry, smart energy systems and grids, smart and sustainable cities, among others.

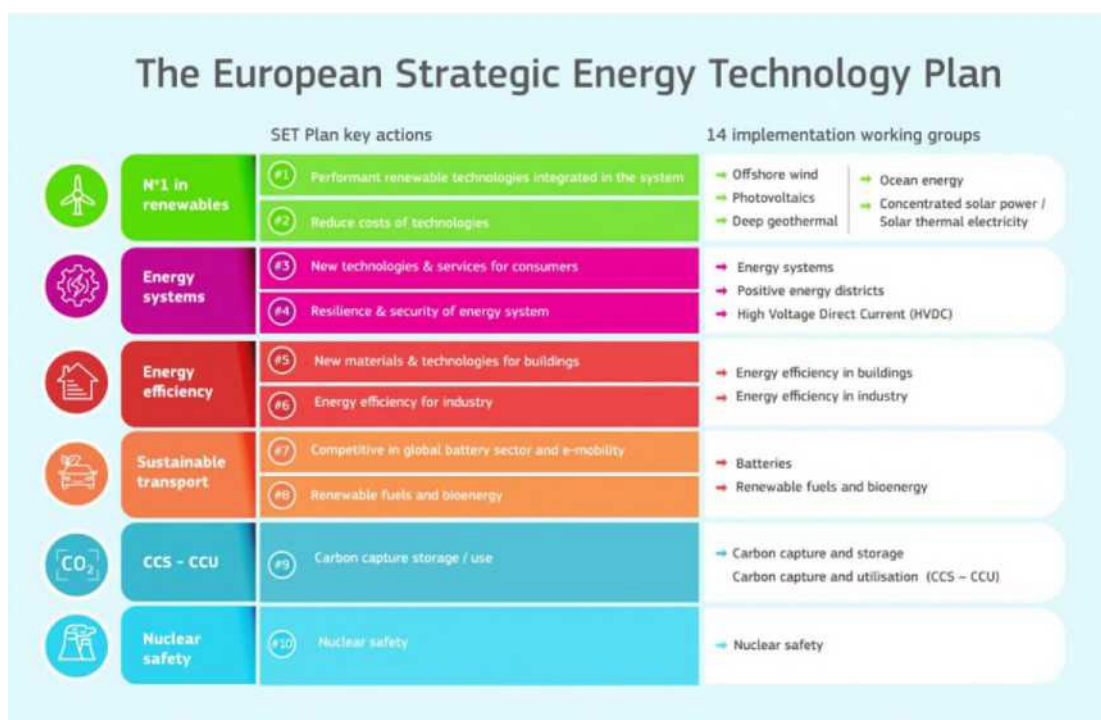
In order to implement the 10 priority actions identified in the SET-Plan, 14 working groups<sup>113</sup> (*Implementation Working Groups*) were set up to define objectives for each of the technologies represented in the groups and implementation plans to achieve them. Spain participates in almost all of the IWGs and is the leader of the concentrated solar industry.

---

(integrated into CEde) and support for R & D & I projects in transport and mobility.

<sup>112</sup>To this end, strategic actions and priorities needed to accelerate the transformation of the energy system in an effective way have been identified, identifying duplications and synergies at European and national level, coordinating national and European efforts in research and project funding. 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<sup>113</sup> plans include the specific R & D & I actions necessary to achieve the objectives set, and non-technological actions, including 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 institutions and industry.



In 2021, a new IWG was approved in high-voltage continuous current transmission network technologies (IWG-High Voltage Direct Current – HVDC). Spain participates in this new IWG.

The EETS Plan is currently in a review process (Revamping) to align it with the objectives of the new European energy policy context.

### b) Objectives

The SET-Plan builds on the 5th pillar of the Energy Union, with the following priorities:

- Europe needs to be a global leader in the development of the next generation of renewable energy.
- Smarter energy system empowering consumers.
- Achieve greater energy efficiency.
- More sustainable transport systems will be promoted.

### c) Mechanisms for action

Facilitate the implementation of the actions identified in the SET-Plan Implementation Plans and propose the creation of new working groups for other low-carbon technologies and provide measures for their implementation.

The EECTI 2021-2027 includes a Strategic Action in Climate, Energy and Mobility which provides the necessary flexibility to facilitate international collaboration and the implementation of the SET-Plan lines.

### d) Bodies responsible

MCIN, through S.G. Innovation and CDTI, coordinated with MITECO.

### Measure 5.3. Complementary plans in the energy and climate sectors

#### a) Description

As indicated in different internal and external analyses (including European Commission Reports and Country Recommendations), there is a need for greater coordination between national and regional levels in the design, implementation and evaluation of R & D & I policies in order to avoid duplication and improve their effectiveness and efficiency. For this reason, the 2021-2027 PEICTI provides for the approval of complementary plans to develop the measures provided for in their various priority axes, as well as those considered to be strategic in the field of R & D & I policy, and the Autonomous Communities and public actors of the Spanish Science, Technology and Innovation System that participate in its funding may be included in their implementation. This will enable the public actors identified to show interest and willingness to participate in greater detail on the various objectives, and will be able to develop, beyond the specific conceptual framework of the respective plans, measures to improve public R & D & I policies, shaping new scenarios for inter-administrative collaboration and thus enabling the State and the Autonomous Communities to focus on new avenues of cooperation in scientific, technological and innovation matters.

In addition, the amendment to the Law on Science includes in Article 42.6 the provision that the State Plan may include supplementary plans, thus giving it the status of a law.

These complementary plans have also been included as one of the tools needed to promote the R & D phase of the ERHA PERTE. This will consolidate the necessary synergies between the deployment of decarbonisation technologies and the R & D phase.

#### b) Objectives

- Promote coordination between state and regional public administrations by establishing concrete mechanisms for cooperation between different 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 the coordination of regional R & D & I capacities in the regional and state strategic areas defined in the smart specialisation strategies.

#### c) Mechanisms for action

The **Complementary Plans with the ACs** are a new instrument for establishing partnerships with the ACs on R & D & I actions that combine common priorities of regional and state smart specialisation strategies and 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, have joint funding and make it possible to align the implementation of funds. In this regard, following an initial phase in which expressions of interest were submitted by the Autonomous Communities, the first four supplementary plans were signed in<sup>114</sup> 2021 in the areas of biotechnology applied to health, Quantum Communication, Energy and Renewable Hydrogen and Marine Science, followed by four others signed in 2022 in the fields of Food, Physical and Physical 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 for an amount of EUR 167 million.

In particular, 10 ACs participate in the **Renewable Energy and Hydrogen Plan**. Aragon, the Principality of Asturias, the Canary Islands, Cantabria, Castile-Leon, Castile-La Mancha, Madrid, Extremadura, Navarre and the Basque Country) and the CSIC. The plan, with a total investment of EUR 92 billion, is geared towards developing strategic hydrogen-based actions to transform the current energy paradigm and minimise greenhouse gas emissions. In particular, the parties have expressed their willingness to identify the following lines of action (LA) as areas of future collaboration for the development of the programme, where appropriate:

- LA-1: Low temperature green hydrogen generation from renewable energy.
- LA-2: Low temperature green hydrogen generation from off-shore wind energy.

<sup>114</sup>The direct award of subsidies to the ACs to finance the implementation of the eight programmes for the implementation of the supplementary plans is regulated by Royal [Decree 991/2021](#), [Royal Decree 287/2022](#) and [Royal Decree 633/2022](#).

- LA-3: High temperature hydrogen generation from renewable energy and using residual heat.
- LA-4: Hydrogen and biomethane generation from biomass.
- LA-5: Generation of biofuels from hydrogen and CO<sub>2</sub>.
- LA-6: Development of systems for pressure storage and supply of green hydrogen.
- LA-7: Uses of hydrogen in heavy transport, aviation and maritime.
- LA-8: Uses of hydrogen in the industrial combustion sector.
- LA-9: Use of hydrogen in the industrial and household sector using fuel cells.
- LA-10: Uses of hydrogen in the industrial sector to reduce CO<sub>2</sub> emissions and as a chemical agent.
- LA-11: Technical and economic studies and the launch of utility models on the market. Dissemination activities, training and capacity building for new researchers.
- LA-12: Overall coordination of the project.
- LA-13: Launch of the National Energy Storage Research Centre.

The CSIC, for its part, will give impetus to the Interdisciplinary Platform on Renewable Energy (PTI115 TransEner +). This platform brings together 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 action lines linked to energy efficiency and climate change are included in other supplementary plans, particularly in the fields of marine science, agri-food, advanced materials and biodiversity.

In the implementation of the supplementary plans, the Autonomous Communities may organise various initiatives such as calls for R & D & I projects. In these calls, companies may be able to participate in these calls, always through competitive tendering procedures.

#### d) Responsible

MCIN, through the Subdirectorate-General for Research and the CSIC, in coordination with the Autonomous Communities.

### Measure 5.4. Scientific and technical infrastructure in the energy and climate sectors

#### a) Description

The term ‘Singular Scientific and Technical Infrastructure’ (ICTS) refers to facilities, resources or services needed to develop cutting-edge research of the highest quality, as well as for knowledge transfer, exchange and preservation, technology transfer and the promotion of innovation. They are unique or exceptional in their nature, with a very high investment, maintenance and operation cost, and the importance and strategic nature of which justifies their availability to all R & D & I groups. ICTS are located throughout Spain and are listed in the so-called **Blueprint of Scientific and Technical Infrastructures**.

In the energy and climate sectors, the Synergy Technical Infrastructure Map contains a number of ICTS:

- ENERGY SECTOR: The Solar Platform of Almería (PSA), the National Fusion Laboratory (LNF) and the Integrated Maritime Experimentation Infrastructure (MAHRIS), in particular its nodes PLOCAN (Canary Islands Oceanic Platform), iClem (UOC Maritime Experimentation Laboratory), Bimep (Biscay Maritime Energy Platform) and CCOBB (Maritime Infrastructure of the Instituto de Hidráulica Ambiental de Cantabria)
- CLIMATE: Doñana Biological Reserve, SOCIB (Coastal Observation System of the Balearic Islands), Spanish Antarctic Bases, FLOTA Oceanographic and PLOCAN.

Spain also participates in numerous international research infrastructures, which are a basic pillar for the

---

115TIPs are interdisciplinary collaborative initiatives that promote a participatory process in the achievement of missions that seek to reach companies and have marketing prospects.



advancement of science and an essential tool for addressing the major issues raised by society. They are excellent examples of European and international cohesion since they are set up as *Joint Ventures*, in which their partners, the Member States and Associates, decide to participate in them according to their national priorities in a scheme of variable geometry. This is because the cost of building and operating these major infrastructures makes it impossible for them to be addressed or financed by a single country. They therefore have an international dimension, as the result of a long-term commitment on the part of countries that decide to work together at the various 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 'ESFRI Landmarks', infrastructures already implemented and offering services to researchers or in the final stages of implementation, covering all scientific domains. Spain participates in a large number of them (some of which have their headquarters in Spain, while some of those considered to be distributed also have nodes in our national territory). In particular, in the areas of energy and climate, the following should be highlighted:

- ENERGY SECTOR: EU-SOLARIS, IFMIF-DONES (both single-location, led by Spain) and others as MARINERG-i (distributed, with nodes located in different locations in the national geography)
- CLIMATE: LifeWatch (whose head office is located in Spain) and others such as ICOS or ACTRIS (with nodes distributed in the national geography)

#### **b) Objectives**

- Boosting R & D & I in the energy and climate sectors supported by the existing specialised ICTS in Spain, in ESFRI research infrastructures whose main headquarters or nodes (if distributed) are located in Spain, as well as in research centres specialised in those sectors.
- Promote access to and use of energy and climate research infrastructures by SECTI actors, both national and European, and increase the interest and participation of the private sector in them.

#### **c) Mechanisms for action**

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 the promotion of excellence. Strengthening ICTS is one of the key elements of the Strategy and will foster regional coordination and cohesion of SECTI with the EU.

The EECTI 2021-2027 also states that opening up major European research infrastructures is essential for the advancement of cutting-edge science and technology at global level, and is 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 to strengthen the capacities, infrastructures and equipment of the National Science, Technology and Innovation System, aimed at the renovation of large national infrastructures, as well as new actions on major European and international research infrastructures, enabling funding from the European Recovery Fund called *Next Generation* EU to be channelled.

It is also worth highlighting the 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 of European research infrastructures, in particular those associated with the fields of energy and climate.

In addition, the CDTI works to support the Spanish industry which contributes to the creation, development and equipment of ICTS by supporting its R & D projects to develop its technological capacities and achieve industrial and technological returns from the GICS in which Spain participates, including ITER in the field of energy and climate.

#### **d) Responsible**

MCIN, via the Secretariat-General for Research.

### Measure 5.5. Public Procurement of Innovative Technology (CPTI) and Pre-Commercial Technology (CPP)

#### a) Description

The amendment to the Law on Science (Article 36e) promotes the development of **public procurement of innovation actions**, which may be aimed at purchasing innovative goods or services that do not currently exist on the market as a final product or service, or research into solutions to future public needs, the resulting technologies being included in the EECTI priority lines or the national and regional plans implementing it. Public Innovation Purchase (PPI) may take the form of Public Purchase of Innovative Technology (CPTI) or Pre-Commercial Public Purchase (PPP).

CPTI consists of the purchase of an innovative good or service which at the time of procurement is very close to the market and involves additional technological development to adapt the product or service to the buyer's needs. It is fully subject to Law 9/2017 of 8 November 2015 on Public Sector Contracts (LCSP). In the environmental field, the LCSP requires environmental management certificates from tendering companies as a condition of technical solvency, i.e. to prove the company's experience or 'good performance' in the field of environmental protection. In addition, this law creates a new procedure aimed at encouraging public procurement of innovation: the "Innovation Partnership" procedure. The Science Act encourages the use of this procedure in the calls for tenders resulting from CPTI procedures.

PPPs are a tool to foster innovation from the public sector, by procuring research and development (R & D) services, 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 encourage systemic innovation, converting public administrations (AGE, ACs). Local entities, public companies, universities, etc.) on drivers of the innovative activity and it is indicated that specific PPI lines will be implemented in relevant areas according to identified public needs.

These initiatives can therefore finance the development of innovative products or services in the field of energy, climate and sustainable mobility to be purchased by public sector buyers.

#### b) Objectives

- Improving public services and infrastructure, by incorporating innovative goods or services, meeting duly identified and justified public needs, on the basis of environmental protection criteria.
- Economic dynamism, internationalisation and competitiveness of innovative companies, with a particular focus on priority policy areas such as energy and climate.
- Boosting the transfer of knowledge and application of research results, and creating launch markets for new technology-based companies.
- Cost savings in the short, medium or long term.
- Experimentation in the design of public policies.

#### c) Mechanisms for action

The mechanisms for promoting public-private partnerships under the 2021-2023 PEICTI include the following instruments:

- CPP, managed by CDTI.
- the CPI-FID line managed by the Secretariat-General for Innovation, which co-finances PPI actions from ERDF funds.

In addition, the European Commission, through the framework programme, grants funding for 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 demonstrated the ability to move quickly to the real environment with high-potential technological specificities, such as green energy and its hybridisation with future and high-scalable energy carriers, and where European capacities are clearly upgradeable or Spanish public-private knowledge shows significant advances, such as biodegradable

batteries, high-efficiency submarine systems, etc.

**d) Bodies responsible**

MCIN, 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 businesses from new technological developments. It is therefore appropriate for the promotion of solutions to energy and climate challenges.

Law 28/2022 on the promotion of the start-up ecosystem regulates the tax classification of the remuneration obtained from the successful management of venture capital entities (known as the '*cared interest*'), while establishing a specific tax treatment for such remuneration, in line with the regulation of the countries in our neighbourhood, which encourages the development of risk capital as a channel for particularly relevant business financing, all with the aim of boosting entrepreneurship, innovation and economic activity.

### b) Objectives

- Attracting venture capital for innovative companies with high growth potential in strategic sectors of the Spanish economy such as energy and climate.
- Increase the volume of activities in the risk capital sector to promote specialisation in emerging technological 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 efficiently.
- Promoting 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 the companies' life cycle and supporting their management needs, technology knowledge and access to international leaders.
- Encourage the development and consolidation of venture capital in Spain at all stages, including capital seed and *equity funds*, through the creation of public or public private funds, and direct public-private co-investment in technology companies.
- Enhance technology transfer from public research centres to civil society.

### c) Mechanisms for action

The **Public Risk Capital Company – INNVIERTE** will launch two new funds to foster the development of entrepreneurial innovation and entrepreneurship:

- INNVIERTE Fund: INNVIERTE 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 enterprises at an early stage, encouraging the transfer of scientific knowledge to the productive fabric.

In addition, in accordance with its Strategic Plan IDAE 2022-2026, IDAE, which already has a portfolio of around 30 projects in the field of energy transition, from wind farms to renewable hydrogen production projects, through demand aggregation platforms, is to position itself as an even more relevant investor in the process of the energy transition. To this end, IDAE intends to offer a wide range of instruments, from direct shareholding in companies to channelling resources through investment funds.

In line with initiatives at European level, Spain will test new financing approaches to support high-risk, high-impact innovation in the field of clean energy (such as Priority Technology Initiatives, FOAK projects –*first of a kind*, etc.), to foster

entrepreneurship and the market uptake of innovative and energy-efficient low-carbon solutions.

**d) Bodies responsible**

MCIN, through CDTI; MITECO via IDAE.

## Measure 5.7. Regulatory changes 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 particular impact in the field of energy and climate, are listed below:

- **Boosting the transfer of knowledge and results of research activity**, which requires improvement by: (1) flexibility for public bodies to establish stable links and partnerships with businesses; (2) agility for the creation of new companies by which to bring research results to the market and for research staff to participate in research; (3) time limits for processing agreements; (4) mechanisms for public-private partnerships.
- **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.

- **Speeding up red tape and reducing the administrative burden** necessary for the financing and implementation of R & D & I projects, which slow down their implementation and are not adapted to the speed of change in the fields related to climate, energy, biodiversity and green economy and jobs.
- **Attracting and retaining research talent**, as researchers require greater flexibility in their contractual relations with public bodies, as well as special attention to their professional development.

Under the PRTR, Spain is carrying out important institutional reforms aimed at strengthening SECTI's capacities to improve its effectiveness, coordination, governance and knowledge transfer. It is worth noting **the amendment to the Law on Science, Technology and Innovation (LCTI)** through **Law 17/2022 published on 5 September 2022**, the reform of which seeks to address the major shortcomings identified, its three main axes being: (1) **improving governance and coordination of SECTI**; (2) achieve an **attractive and stable scientific career** in order to retain scientific talent; (3) **strengthen the transfer** of the results of the research activity to the company.

To accompany the reform of the LCTI, the **Plan for attracting and retaining scientific and innovative talent to Spain** has been approved. In addition, in accordance with the OECD Roadmap to Improve Knowledge Transfer in Spain, a **Knowledge Transfer and Collaboration Plan** has been drawn up with the aim of strengthening links between the public and private sectors in RDI, in order to increase the socio-economic impact of public research investment and boost the innovative capacity of Spanish companies.

In addition, the amendment to the LCTI introduces forecasts for regulatory test beds 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 conventions for R & D & I and promotes the adoption of measures to reduce administrative burdens.

Furthermore, **Organic Law 2/2023 of 22 March 2015 on the University System**, recently adopted, introduces amendments relating to the research and transfer role of universities, in order to promote interdisciplinary and multidisciplinary research and networking, as well as the creation and participation of knowledge-based enterprises, among other relevant issues.

**Law 28/2022, of 21 December, on the promotion of the start-up ecosystem** incorporates a series of administrative, fiscal and remuneration measures aimed at facilitating the creation and growth of innovative knowledge-based enterprises (*start-ups*), attracting and securing talent and stimulating investment. Its policy framework includes technology-based or science-based companies, including companies based on disruptive energy and climate-related technologies. In addition, public-private collaboration 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, establishing the general framework for the regulatory test bed to promote research and innovation in the electricity sector**<sup>116</sup>. These *sandboxes* are a key element in providing controlled environments for testing new products and services, thus facilitating the adaptation of the regulatory framework to respond to the new context of a more dynamic, decentralised, clean, sustainable electricity sector that puts citizens at the centre. Its implementation is of particular relevance in the field of energy storage, 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 promote and regulate the use of testing facilities as a regulatory testing space to carry out pilot projects for research and innovation in onshore and offshore renewable energy.

In addition, and in accordance with the eighth final provision of the LCCTE, the draft Sustainable Mobility Act, which regulates sandboxes or regulatory sandboxes or regulatory sandboxes for transport and mobility, is being prepared for regulatory innovation.

## b) Objectives

<sup>116</sup>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.

- Consolidate a robust knowledge generation and transfer system to address major challenges such as the green and just transition, digitalisation or the demographic challenge.
- Encourage the uptake of talent in organisations and entities in the field of energy and climate R & D & I, by empowering the best researchers and technologists to join and consolidate their careers, in a context of budgetary and financial stability and to focus their efforts on achieving R & D & I objectives.
- Fostering generational renewal by fostering scientific and technological vocations, providing opportunities for young talents and stimulating STEM education from early stages of education with an inclusive approach fostering diversity and quality education.
- Incorporating research staff into the business and industrial sectors, encouraging mobility from business to science and technology and vice versa, and fostering the absorption capacity of research staff in the business fabric.
- Provide the administration with greater flexibility in the processing of agreements and the granting of aid.
- Have regulatory research and innovation spaces to test potential regulatory improvements in circumscribed environments with the aim of developing new standards and updating existing ones, applying best practices and bringing verified developments in the experimental environment into the regulatory framework.

#### c) Mechanisms for action

- Implementation and monitoring of LCTI's regulatory measures to attract and retain talent, including the design of the evaluation and accreditation system to establish an entry route (*Tenure Track*) and the flexibility mechanisms for recruitment in the public sector.
- Promote pre-doctoral and post-doctoral recruitment through competitive calls and the incorporation of research staff into the private sector. It should be noted that the 2021-2023 PEICTI includes the possibility of associating support for the recruitment of research staff in companies (industrial doctorates and Torres Quevedo) with the design and monitoring of mechanisms for evaluating transfer activities.
- Efforts will be made to adopt measures to make the management of aid more flexible and simplified as a cross-cutting line of action.
- Public-private Partnership (EIP) and Cervera Transfer Projects (CDTI).
- The creation and growth of new technology enterprises will be facilitated by simplifying administrative procedures for their creation, improving tax and social benefits, through targeted calls for support (such as Neotec) and by developing mechanisms to facilitate capital investment.
- Targeted calls will facilitate access and promote the participation of projects in regulatory *sandboxes*.

#### d) Bodies responsible

MCIN; MITECO; Ministry of Universities; Ministry of Economic Affairs and Digital Transformation.

## Measure 5.8. Promoting public-private partnerships

### a) Description

Public-private partnerships and transfer are critical to increase the entrepreneurial innovation effort and enable businesses, and more particularly SMEs, to have a broader base of multidisciplinary knowledge needed to address large projects of high research and technological intensity to respond to societal challenges, including the energy and environmental transition.

The amendment to the Science Law reinforces 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 clarifies that the transfer of knowledge must take place in both directions, enriching and improving the productive and business fabric, but also generating profits and advantages in the public sphere for the benefit of society as a whole.

In this line, one of the priority axes of the EECTI 2021-2027 is to promote public-private collaboration. Both the PEICTI and the PRTR provide for lines geared towards public-private collaboration to boost research along strategic lines, through collaborative projects, promoting networking or promoting 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, diffusion of ideas and adoption of shared objectives and models supports the development of new ideas and their transfer to technological applications.
- Promote the role of intermediary bodies, in particular Technology Centres (CCTT) and Technology Innovation Support Centres (Cait), as facilitators of knowledge transfer between public and private spheres and foster collaboration between them.

### c) Mechanisms for action

- The CERVERA aid, managed by the CDTI, finances three types of actions involving the CCTT and the Cait registered at State level:

The Cervera Transfer R & D Project Programme, which funds collaborative projects between companies and research organisations in priority CERVERA technologies related to energy and clim a117.

\_Cervera Aid Programme for energy and climate related CCTT and Cait network clusters.

\_Creation of innovation ecosystems to foster networking and stable collaboration between public and private research actors around priority technologies CERVERA to exploit synergies and capacities of participants in the ecosystem.

- Under the programme Missions in Science and Innovation, managed by the CDTI, tractor projects are launched in areas related to the “Green Challenge”<sup>118</sup>, which are carried out in collaboration between companies with mandatory participation of bodies from research.
- The EIP finances public-private partnerships through various instruments, notably the Research Networks programme, which targets both thematic networks (in the areas of energy and transport and areas of environmental science and technologies) and strategic networks in the field of energy and climate for the national management and coordination of national and international strategic initiatives. Also through the programme of public-private partnership projects and strategic projects geared towards the Ecológic transition<sup>119</sup> be developed in public-private partnerships, as well as

<sup>117</sup>The Cervera Network chiefly concerns the development of R & D lines grouped into 11 thematic areas. Energy and Climate can also be found directly or indirectly in several of the proposed lines and, in particular, the “Energy Transition” line.

<sup>118</sup>The missions identified 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)”, “Fostering a more sustainable agri-food sector adapted to the new conditions associated with climate change through the relevant use of advanced biotechnology tools” or “Developing application technologies in the naval sector that improve competitiveness in the 21st century”.

<sup>119</sup>They target aspects such as decarbonisation, energy efficiency, renewable energy deployment, electrification of the



proof of concept and/or projects<sup>120</sup>.

- In the framework of the PNACC, a programme is foreseen for the creation of networks for exchange, collaboration and coordination between research staff and the different actors in climate science and adaptation to climate change.
- In the area of sustainable mobility, a programme of networking and coordination between the different actors in the transport and mobility innovation ecosystem is planned and will be managed by the Secretariat of State for Transport, Mobility and the Urban Agenda.

#### d) Responsible

MCIN, through the EIP and CDTI; MITECO; MITMA.

### Measure 5.9. Shared renewable energy research centres

#### a) Description

Within the framework of the collaboration between the AGE and the ACs and in order to strengthen technological development in the field of renewable energy, there is the possibility of setting up **jointly owned research centres**, which remain at the service of the entire national scientific and technological community and open to international collaboration. This was the case of the **National Centre for Experimentation of Hydrogen and Fuel Cells Technologies (CNH2)**, set up as a consortium by signing an agreement with Castile-La Mancha for its design, construction, equipment and operation. CNH2 targets scientific and technological research on all aspects of hydrogen (generation, storage, transport, use, etc.) and fuel cells.

Another notable example is the **National Renewable Energy Centre (CENER)**, established in 2000 as a non-profit foundation, with shared ownership between the AGE (through MCIN, MITECO and CIEMAT) and the Government of Navarre. It specialises in applied research and the 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 grid integration of energy.

In the same vein, an agreement was signed on 20 December 2021 between the AGE (through the MCIN and CIEMAT) and the Government of Extremadura for the creation, equipment and implementation of the **Iberian Energy Storage Centre (CIAE)** with the aim of stimulating 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 and Innovation of the Kingdom of Spain and the Ministry of Science, Technology and Higher Education of the Republic of Portugal for the creation and development of CIAE. CIAE is focusing on addressing the technological and scientific challenges of enabling green energy production to be managed. The centre will carry out research in energy storage for the development of R & D & I activities providing solutions concerning both the deployment of battery based energy storage technologies and industrial applications of hydrogen and other renewable gases and the large-scale production, storage and transport of the hydrogen industry.

The scientific objectives of the centre include: (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 the materials used for storage, to the processes and their integration, including advanced control and monitoring; (3) system analysis and modelling, through energy carriers and scales with storage. Integration models for 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.

The implementation of the activities requires the development of demonstration experimental facilities to test and validate energy storage solutions, the purchase of scientific and technical equipment, the launch of prototypes, and the training of industry professionals in this field.

---

economy, development of energy storage, nature-based solutions, green restoration, circular economy and improving the resilience of all economic sectors.

The 120 projects supported should have the potential to bring their results to the market or to generate value in society. They are aimed at encouraging the early stages of pre-competitive development and facilitating its practical application, such as protecting the knowledge generated, analysing the technical, commercial or social feasibility, obtaining technological prototypes, developing pilot scale, testing with end-users, defining the business model, or early stages of setting up a business.

**b) Objectives**

- Ensure, through research and development, energy supply, increasing the contribution of renewable energy and emerging energy technologies, in an efficient and competitive manner and their integration into the national energy system, so that their contribution improves security of supply, diversification of sources of supply and environmental protection.
- Strengthen the leadership of Spanish technology and competing companies in this field, improve the energy efficiency of our economy and reduce the country's economic and geostrategic dependence.

**c) Mechanisms for action**

- 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 of the Iberian Centre for Energy Storage R & D, with majority RRF funding.

**d) Responsible**

MCIN, through the Secretariat-General for Research and CIEMAT; MITECO; associated Autonomous Communities.

**Measure 5.10. Promoting an innovation hub on renewable energy, storage and hydrogen at the City of Energy Foundation, CIUDEN**

**a) Description**

The Ciudad de la Energía Foundation (CIUDEN) is a state public sector foundation attached to the Institute for Just Transition (ITJ) and reporting 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 control of the Spanish Government to implement R & D & I programmes relating to energy and the environment and to contribute to the economic development of the territories involved in the energy transition process in Castile-Leon, which can extend its activities to any part of the national or international geographical territory if this is necessary for the development of the projects.

**b) Objectives**

Promotion of Just Transition actions and promotion of economic, social and employment development in the districts of Castile-Leon affected by the energy transition process, through research and activities in renewable energy, storage and energy efficiency, storage and green hydrogen.

**c) Mechanisms for action**

- Adaptation of its facilities at the Centre for the Development of Technologies, located in Cubillos del Sil (León), in order to have units focused on energy storage and green hydrogen. This project falls under Component 10 of the PRTR Just Transition Strategy.
- CIUDEN's economic and technological transformation plan to ensure that, in line with the Just Transition Strategy (see Measure 1.25), it plays a significant role in relaunching the areas of Castile-Leon affected by the energy transition. It also acts as a political body of MITECO's policy on the issues it considers necessary to meet the objectives in other areas.
- Development of a feasibility plan focused on the technological development of renewable energies, storage systems or systems linked to green hydrogen, as well as other cross-cutting blocks such as digitalisation and energy decentralisation.

**d) Bodies responsible**

MITECO

### Measure 5.11. Improve governance and coordination of SECTI

#### a) Description

The LCTI establishes the instrumental character of **EECTI and its development plans** to achieve the R & D & I objectives set in a multiannual reference framework and the **Science, Technology and Innovation Information System (SICTI)** as a tool for data capture and analysis for the development, monitoring and evaluation of data.

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 major difference that shows a new way of planning and designing R & D & I policies based on the results obtained 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 measures 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, the necessary coordination mechanisms between the ministerial departments and their financing agents must be implemented at national level.

In this regard, in accordance with the 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 reporting to the MCIN, as well as representatives of trade unions, business and civil society. Its main role is to monitor the Strategy on an annual basis, supported by the SICTI Working Group.

In parallel, and in accordance with the provisions of the PEICTI 2021-2023, the PEICTI **Coordination, Monitoring and Evaluation Committee (CCSE-PEICTI)** has been set up, involving all ministries involved in R & D & I and the three state funding actors (CDTI, AEI and ISCIII). Its primary tasks are to: drawing up the Annual Action Programme (AAP), promoting synergies and coordination between the actions of the various ministries and monitoring and evaluating the actions set out in the PEICTI. The Committee has a variable geometry which provides for the incorporation of quadruple helix and makes it possible to set up sectoral or thematic working groups. With this extended geometry the CCSE-PEICTI will be the core scope for monitoring the 2021-2023 EIRP and, depending on the results, the development of the PEICTI for the period 2024-2027.

#### b) Objectives

- 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 move the economy towards the energy and climate transition.
- Improve the monitoring of resources devoted to R & D & I, including the monitoring of actions carried out in the identified strategic areas, as well as the assessment of the actual impact achieved.

#### c) Mechanisms for action

- The monitoring and evaluation procedure established in the framework of the EECTI Committees and the PEICTI will allow an analysis of the strategic lines defined as priorities in our environment, so that they can be updated throughout the planning period.
- Improvement of the collection system for R & D & I actions to be integrated into the AAP, including actions in the field of energy transition as part of the Strategic Action on climate, energy and mobility, and development of spaces to improve their visibility and dissemination.
- The advanced development of the SICTI is planned to improve data collection, processing and exploitation through the incorporation of artificial intelligence techniques, enabling monitoring and evaluation.

#### d) Bodies responsible

MCIN 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 PRTR, financed by the European Recovery Plan, NextGenerationEU, and in particular financed by the European Recovery and Resilience Facility, will enable 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 productive model for the recovery of the economy from the economic, social and health crisis triggered by the COVID-19 pandemic.

The PERTE (Strategic Projects for Economic Recovery and Transformation) are strategic projects with a strong capacity to drive economic growth, employment and competitiveness, with a strong public-private partnership component and cross-cutting across the different administrations. They are a permanent figure set up under the PRTR, designed as a mechanism to promote and coordinate highly priority projects, which are particularly complex or where there is a clear market failure, major externalities or insufficient private sector initiative or investment capacity.

The PRTR states that almost 40 % of investments will be spent on the green transition. Within the 12 PERTE approved for the time being, the following should be highlighted as being directly linked to the energy transition to a carbon-neutral economy:

- **Renewable Energy, Renewable Hydrogen and Storage** PERTE (ERHA)
- PERTE for **Electric and Connected** Vehicle Development (ECV)
- Industrial Decarbonisation PERTE

These are at the same time complemented by the **aerospace** PERTE and the **naval industry** PERTE, which promote the use of renewable gases in maritime and air transport and by the linking of the shipping sector with offshore wind energy deployment. They are also complemented by the **circular economy** EERPs (which includes among its priority sectors the reuse, treatment and recycling of materials in the field of renewable energy, e.g. recycling of blades of wind generation installations at the end of their life, promotion of biogas), **agro-food** (which integrates actions towards energy efficiency, such as modernisation of irrigation with electricity self-supply using renewable energy, mainly photovoltaic) and **digitalisation of the water cycle** (e.g. exploitation of the gases generated during water treatment for the production of electricity to be used in the plant itself).

### b) Objectives

- Strengthen the value chain to respond to the energy transition with its own solutions, technologies and capacities, harnessing the human potential to generate jobs and strengthen the sector's leadership and external 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 a position in the production system in those areas where Spain is already a leader and strengthening those with a lesser presence, improving the capacity to integrate new technological solutions into the productive fabric through R & D & I.
- To boost social innovation and new business models in the energy transition, as well as to position Spain as a reference point in key energy transition technologies, both in renewable generation, energy storage and the production and exploitation of renewable hydrogen.

### c) Mechanisms for action

- To underpin the areas associated with the energy transition, the Spanish Government approved the PERTE ERHA, which will significantly contribute 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 the ERHA PERTE, generally organised through competitive calls for

tenders, cover the entire renewable energy value chain and its integration into end uses, from knowledge development to commercial deployment. Actions in R & D & I include applied research, experimental development and test bed projects or new capacities in the R & D ecosystem; innovation projects for the development of technological, industrial and new business models, including support for new components manufacturing and integration lines or capacities in different sectors, public investment in technology-based companies (*start-ups, spin-offs*) or SMEs to boost their growth.

The ERHA PERTE is structured into transformative measures, which fall under components 7, 8, 9 and 17 of the PRTR, as well as into the R & D phases and phases II 'Capacities and Deployment'.

The R & D phase I includes applied research, experimental development and test beds projects or new capacities in the R & D ecosystem. Transformative measures to be highlighted, which will significantly contribute to R & I + c, within this phase include:

- Incentive to unique and innovation projects in renewables, 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.
- Improving capacities and enhancing R & D in renewable hydrogen.
- Grant of subsidies to the Autonomous Communities to finance the implementation of four programmes for the implementation of the Supplementary R & D & I Plans, with a specific heading for 'Renewable Energy and Hydrogen'.
- Improvement of the infrastructure of the Centre for Energy, Environmental and Technological Research (CIEMAT) on renewable energy research.
- Launching a call from the State Research Agency for strategic projects targeting the green and digital transitions.
- Strengthening the call for grants for Science and Innovation Missions of the Centre for Technological Development and Innovation (CDTI), which includes a mission on "Secure, efficient and clean energy for the 21st century" with a dedicated call for strategic projects targeting the green transition.
- Creation of an Iberian R & D centre for energy storage in Extremadura.

In addition, phase II aims to consolidate technological, industrial and new business models, including support for new manufacturing lines, public investment in technology-based companies (*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 and hydrogen generation technologies
  - Support for New Business Models in the Energy Transition.
  - Strengthening logistical adaptations and port facilities necessary for the energy transition, in particular in relation to offshore wind.
  - Capacity building for heavy hydrogen mobility.
- The Plan + SE includes as a measure the acceleration and extension 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 the energy costs of the manufacturing sector. It is envisaged to support R & D projects of 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 VEC PERTE include:
    - Integral actions of the VEC industrial chain managed by MINCOTUR, which include an R & D & I line and a line of innovation in sustainability and energy efficiency;
    - the unique MOVES programme, managed by IDAE, to finance technological development projects and innovative experiences in electric mobility.
  - The Industrial Decarbonisation PERTE incorporates a comprehensive aid line for the decarbonisation of the 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 reduction of natural resources; (5) R & D & I to boost the

decarbonisation of installations.

- The CDTI contributes to the EPRTs related to renewable energy, sustainable mobility and the shipbuilding industry through the Missions Programme and through specific instruments such as the Aeronautical Technology Plan (PTA) or the Sustainable Automation Technology Plan (PTAS).

**d) Responsible**

MITECO and its public business entity IDAE; MCIN, through CDTI; MINCOTUR

### Measure 5.13. Technology platforms and ALINNE alliance

#### a) Description

Technology Platforms are an indispensable player in promoting public-private dialogue and partnership, and are an instrument of R & D & I policy, carried out by the business fabric, an important player in the definition of both sectoral and cross-sectoral R & D & I priorities and a means of involving 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 spirit of connecting all actors in the value chain, ALINNE was set up as an alliance between public (administrations and knowledge generators) and private actors (technology companies and platforms), and created as a tool for energy research and innovation, to bring together and coordinate efforts between all actors to address the main energy R & I challenges. It is established as a forum for strategic analysis of Research and Innovation in key technological areas for the energy transition, including energy technologies and enabling or enabling technologies and their technology supply chains. Its mission is to contribute to the definition and monitoring of the national strategy in the field of research 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 an extensive map of national capacities (Energy Efficiency, Biomass, Wind Energy, Solar Concentration, Low-Temperature Solar, Photovoltaic, Geothermal, Hydrogen and Piles, Intelligent Networks, Energy Energy, Energy Storage Systems, as well as CO<sub>2</sub>Storage 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, development and demonstration to make clean energy affordable, attractive and accessible to all. It also supports the work of the relevant managing bodies to encourage participation in international initiatives<sup>121</sup> and encourages and coordinates Spanish participation in the European Energy Research Alliance (EERA).

#### b) Objectives

- Accelerate the development and consolidation of new sustainable energy technologies by integrating existing capacities into public centres and businesses and integrating all actors in the value chain.
- Promote effective and stable public-private partnerships on the basis of 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 energy R & D & I, 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 segments or niches of the future, both in the field of fundamental research and in the field of technological and business development.

#### c) Mechanisms for action

The creation and consolidation of Technology and Innovation Platforms will be promoted through competitive calls for aid (EIP) with a view to improving the technological capacity and increasing competitiveness of the national production sector by carrying out knowledge-sharing, planning and dissemination activities.

CIEMAT will boost the activity of the ALINNE alliance, with a working team to maintain the operating structure, as well as proposing and implementing initiatives of common interest, which will be sustainable in competitive competition or through direct funding.

<sup>121</sup>Especially at European level, such as: the Framework Programmes, SET-Plan, European Technology Platforms (ETP) or Innovation and Knowledge Communities (KIC)



**d) Responsible**

MCIN, through its EIP and CIEMAT bodies

## Measure 5.14. Enhancing the internationalisation of SECTI actors in the field of energy and climate

### a) Description

The 2021-2027 EECTI incorporates as a cross-cutting **policy window the internationalisation** of SECTI actors by: (I) promoting participation in international programmes such as Horizon Europe and its Joint Programming Initiatives; (II) international collaboration supported by science diplomacy; (III) international cooperation for sustainable development; (IV) promotion of and participation in international scientific and technological facilities and infrastructures.

In addition, the 2021-2023 PEICTI considers it one of its strategic drivers to contribute to the consolidation of the European Research Area and to boost the internationalisation of SECTI actors, fostering international collaboration to address jointly and in a coordinated manner major societal challenges, including climate and energy.

Promoting Spanish participation in European and international programmes requires a targeted exercise to optimise the use of available resources, in accordance with our country's priorities, strengths and interests. To this end, an **Incentive 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 corresponding national and regional plans. It is also important to lead and participate in co-financed programmes, in which Spain will have to allocate own resources, seeking alignment of state and regional aid and its synergy with European funds, as well as Spanish leadership and 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 and return in Horizon 2020 in the 2014-2020 period in the EU. In particular, in the field of energy and climate, Spain has been the second largest country to participate in both societal challenge 5 'Climate action, environment, resource efficiency and raw materials' and challenge 3 'Secure and efficient clean energy'.

In the new framework programme for 2021-2027, Horizon Europe, it has been agreed that programmed actions should contribute to climate objectives with a minimum of 35 % of the overall financial envelope. Spanish participation in Horizon Europe programmes and in particular those most focused on energy and climate, which are primarily focused on Cluster 5, will be encouraged. Climate, Energy and Mobility and Cluster 6. Food, Bioeconomy, Natural Resources, Agriculture and Environment. At the level of joint programming, participation in the European partnerships will be encouraged, in particular in DUT (innovative technologies and solutions for urban transition) and TEC (technologies for clean energy transition), which include technologies needed for the clean energy transition and for the urban transition, as well as in the EU Missions, in particular the Climate Neutral and Smart Cities Mission and the Climate Change Adaptation Mission. Participation in other European programmes, such as the LIFE programme, the only European Union financial instrument 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 initiatives that jointly address certain aspects of the energy transition are proliferating. In particular, we should highlight the international Mission Innovation initiative to strengthen its alliances at international level and move towards the decarbonisation of the economy.

Scientific cooperation and international collaboration will therefore be promoted, including international development cooperation and science diplomacy in policy areas identified as priorities. This in turn creates a favourable environment for the identification of emerging scientific and technological opportunities in geographical areas outside the EU, especially in Latin America.

Finally, it should be borne in mind that in the future VI Blueprint for international cooperation, the 2030 Agenda and the achievement of its SDGs, in particular SDGs 7 and 13, will be the guiding axis.

### b) Objectives addressed

- To facilitate and promote the successful participation of Spanish research groups, companies and other actors in European and international R & D & I programmes.
- Maximise synergy and partnership with entities outside Spain through public-private cooperation to encourage foreign investment, as well as the participation of Spanish companies and research centres in international tenders 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 staff seconded to the management and management bodies of international, European and intergovernmental associations engaged in R & D & I, in particular in the fields of energy and climate.

#### c) Mechanisms for action

- Calls for grants to stimulate participation in European initiatives and projects and to promote R & D & I management networks, especially under Horizon Europe.<sup>122</sup>
- 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 transition.<sup>123</sup>
- Promotion of thematic networks and strategic R & D & I projects, in cooperation with Latin American and Carib countries<sup>124</sup> and Asia and Africa, in the areas of renewable energy, micro-grids, storage, environment and water treatment and detoxification.
- Promote administrative processes to create units in other priority countries, with specialised staff to identify strategic lines of interest and facilitate the attraction of talent to our country.
- Design an attractive tax regime for foreign investment in R & D & I, and in particular from international foundations and funds.
- Creation of lines of support 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.

#### d) Bodies responsible

MCIN, through the EIP, 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 aim to demonstrate the scientific and technological feasibility of obtaining nuclear fusion energy by magnetic confinement. ITER has been designed as the key experimental step between the current fusion research facilities and the commercial fusion energy plants of tomorrow. To this end, ITER members (China, the EU Europe<sup>125</sup>, India, Japan, Korea, Russia and the United States) are working together to build the world's largest tokamak device in southern France. The main objective of ITER is research and demonstration of plasma in ignition, plasma in which the energy produced by fusion reactions is sufficient to maintain plasma temperature by reducing or eliminating the need for external warming. 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 is planned for 2025, although a delay of several years is expected as a result of a review of the timetable currently taking place.

Europe is responsible for most of the ITER construction costs (45.6%), with a major contribution in kind (approximately 85%) in the form of the provision of completed components, systems and buildings. Spain participates in this joint experiment at international level in the framework of ***Fusion for Energy (F4E)***, the European domestic agency in charge of managing tenders for ITER contributions. With its headquarters in Barcelona, one of F4E's main tasks 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

<sup>122</sup>Concrete examples of these calls include: Europa Networks and Managers – Europe Technology Centres (CDTI), International Collaborative Projects (CDTI, EIP, ISCIII), Europe Research (REA), Europe Excellence (EIP), European Project Management (EIP), Innovator-Eurostars 3 SME Partnership (CDTI) and DUT and CET Partnerships (formerly ERA-Nets).

<sup>123</sup>These include the Eureka Programme, PRIMA, ISGAN and EIA tasks, among others.

<sup>124</sup>Through participation in programmes such as Cytec (Ibero-American Science and Technology for Development Programme), EU-CELAC, EUROCLIMA + or UNIDI.

<sup>125</sup>Within the EU framework, 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.

for ITER. Their location in Spain facilitates the participation of Spanish companies and research centres in the various projects. Since 2008, our companies have obtained approximately 370 contracts, awarded from both the ITER Organisation and F4E, for around EUR 1.350 million. At recruitment level from F4E, Spain is in third position after France and Italy. F4E also supports R & D initiatives on fusion through the **Broader Approach Agreement (BA)**, a pact between Europe (through Euratom) and Japan, which aims to carry out complementary activities to the ITER project and accelerate the development of fusion by preparing the construction of a demonstration plant for electric fusion production, which will aim to produce electricity from fusion energy generated internally. 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 threefold: IFMIF/EVEDA, Tokamak JT60SA and IFERC (all located in Japan). Participation in the IFMIF- EVEDA project, the forerunner of IFMIF-DONES, has been crucial to positioning Spain with an advantage for the application to set up IFMIF-DONES in Granada.

The Fusion Programme contains a third pillar, known as **IFMIF-DONES (International Fusion Materials Irradiation Facility-Demo Oriented Neutron Source)**, which consists of the construction of a scientific facility to generate a source of neutrons 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 convention or 126 between the AGE (through the MCIN) and the Junta de Andalucía, will be the body responsible for the design, construction and operation of the scientific facility IFMIF-DONES, which is based on a high-power particle accelerator and will be located in Granada. This project is part of the *roadmap* for European ESFRI infrastructures.

#### b) Objectives

- Promote fusion energy as a possible solution to environmental and energy supply problems.
- Increase the participation of Spanish companies and research centres in the supply of components and services under the Fusion Programme, increasing the technological capacities of companies in this field.
- To maximise the technological and industrial return resulting from the Spanish contribution to the Large Science Facilities and to promote that the contracts implemented in these infrastructures by the national industry are of the highest possible relevance and technical excellence.

#### c) Mechanisms for action

- 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 stellarator Helic Flexible TJ-II and associated auxiliary systems such as plasma heating and diagnosis and material study laboratories.
- CIEMAT also provides support to Spanish companies so that they can benefit from the opportunities arising from major scientific facilities.
- CDTI, such as ILO (Industrial Liaison Officer) acts as a contact point between major scientific infrastructure (GICs) such as ITER and Spanish companies interested in participating in industrial opportunities, providing information from tenders, advising companies in submitting offers for technological supplies and monitoring awarded contracts.
- Annual contributions from the AGE and the Regional Government of Andalusia to the IFMIF-DONES consortium, through transfers, subsidies or allocation of European funds from the ERDF or ESF Operational Programmes.

#### d) Responsible

MCIN, via CIEMAT and CDTI.

---

<sup>126</sup>[Decision of 18 June 2021 of the Secretariat-General for Research publishing the Agreement with the Autonomous Community of Andalusia for the establishment of a consortium to promote the construction in Spain of the scientific and technical infrastructure 'International Fusion Materials Irradiation Facility-Demo Oriented Neutron Source'.](#)

## Measure 5.16. Mission Innovation 2.0

### a) Description

Global challenges require a comprehensive response based on cooperation between governments. The decarbonisation of energy systems is an international priority and initiatives that jointly address certain aspects of the energy transition are proliferating.

In this context, at COP 21 in November 2015, **Mission Innovation (MI)** was launched as a global initiative of 22 countries plus the EU, to bring together global efforts in the fight against climate change and the acceleration of clean, affordable and accessible energy technologies for all. A new Joint Declaration by MI was launched in June 2021, constituting **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 pioneers in clean energy solutions through national innovation action and international cooperation
- Catalyse 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) Mechanisms for action

Spain participates in three Missions: Clean Hydrogen, Energy Future Green and Urban Transition, through the Energy Technology Platforms and Cities Platform.

MCIN is responsible for this initiative with the support of ALINNE.

### d) Responsible

MCIN, through the Secretariat-General for Innovation and CIEMAT.

## Measure 5.17. European Energy and Climate Innovation Funding Facilities

### a) Description

Under 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 the potential to support R & D & I projects in the field of energy and climate, as they are fully or partially aimed at supporting the energy transition and the development of technologies for the decarbonisation of the economy. These instruments include the following:

- **European Investment Bank (EIB) financing facilities:** through the EIB's Roadmap 2021-2025 as Climate Bank Europe<sup>127</sup> has increased its level of climate and environmental commitment, setting the objective of doubling its climate target from 25 % to 50 % by 2025. As of 2021, it also ceases to fund fossil fuel projects. It should be noted that the EIB can support the whole spectrum of innovative technologies: from seed capital for development at a very early stage, to senior debt.
- **European Investment Fund (EIF):** EIF Climate Fund and Infrastructure 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:** created for the long-term EU budget (2021-2027) as a successor of the Investment Plan for Europe, it brings together the EFSI and 13 other financial instruments to pool financing from the EU budget in the form of loans and guarantees under the same structure and aimed at supporting 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 investments under InvestEU 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 period 2020-2030 focused on innovative low-carbon technologies, whose revenues come from the EU Emissions Trading System (EU ETS) and from the remaining NER300 programme. It works 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); Carbon Capture and Storage (CCS) construction and operation; Innovative renewable energy generation; Energy storage
- **ConnectingEurope – 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 2021-2027 financial period. 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 field of energy.

### b) Objectives addressed

Mobilisation of European funds to finance the R & I + c dimension of the NECP.

### c) Mechanisms for action

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) or the European Investment Fund (EIF) have made it possible to channel significant amounts from these institutions to the Spanish economy. At the same time, ICO has promoted the participation of private sector investors and financial institutions in projects under the CEF programme. Since 2021 ICO has been accredited by the European Commission to manage InvestEU Programme funds as 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.

Work is ongoing from the CDTI to become part of the Implementing partners for InvestEU funds.

<sup>127</sup>[EIB Climate Bank Roadmap 2021-2025](#)

**d) Bodies responsible**

ICO; MCIN through CDTI; MITECO.

### Measure 5.18. Regulatory testing bank in the electricity sector

#### a) Description

The transition to a 100 % renewable electricity system in 2050 poses major challenges, since to manage generation variability it is necessary to increase system flexibility with new actors and services, and with different configurations and interactions between technologies and actors, and these transformations require continuous adaptation of regulation in the electricity sector. The rapid pace of change in this sector therefore requires an environment conducive to research and innovation in the sector. However, innovative projects often face regulatory barriers that prevent the development of tests and models to support the analysis of whether regulation should be changed in general, or the functioning and usefulness of a particular system, service or technology. In this context, regulatory test beds are emerging as experimental, government-controlled and supervised environments to test potential regulatory improvements in circumscribed environments, in order to review and update the regulatory framework to move those verified developments into the experimental environment. This ensures at all times the 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 encourage regulatory learning and dialogue, leading to a regulatory framework 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 businesses and offering them the opportunity to test their business models.

Pilot projects participating in the electricity test bench will include experimental testing and will require at least an exemption from regulation of the electricity sector, the ultimate objective being to achieve 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 waive partial compliance with a rule, including the possibility to act in the absence of specific regulation, within the electricity sector. In any case, European law is applicable and exemptions contrary to the internal market cannot be authorised.

#### b) Objectives addressed

- Facilitate research and innovation in the electricity sector.
- Encourage regulatory learning and better regulation.
- Contribute to the achievement of energy, climate and environmental sustainability objectives.

#### c) Mechanisms for action

Law 24/2013 of 26 December 1997 on the Electricity Sector provides that the general framework of the regulatory test bank for the participation of pilot projects shall be laid down by regulation by Royal Decree of the Government, followed by specific calls by order of the Minister for the Ecological Transition and the Demographic Challenge.

By virtue of the provisions of that law, 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 was approved, and Order TED/567/2023, of 31 May, calling for 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) Bodies 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 axes defined in Regulation 2018/1999 on the Governance of the Energy Union and Climate Action. However, this section addresses three issues that are cross-cutting to the five dimensions described.

First, some measures that are cross-cutting to the whole Plan, cannot 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, and which will be addressed in this review.



Secondly, this section includes the synergies and interlinkages between this NECP and other plans. An example of this is the Recovery, Transformation and Resilience Plan, which has used the current NECP as a solid foundation and<sup>128</sup> for the design and design of the green component of the Recovery Plan. The same analysis is transferred to other structural 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 here that one of the guiding principles of this Plan is '*energy efficiency first*', as an increase in it leads to a decrease in energy needs, in turn contributing to the decarbonisation of the system by reducing emissions, while increasing energy independence. In turn, a smaller scale of energy needs in the production sectors increases competitiveness by reducing energy costs, thus contributing to the internal market dimension.

### 3.6.1. Integration of environmental aspects into the NECP

The preparation of the NECP is subject to the Strategic Environmental Assessment procedure provided for in Law 21/2013 of 9 December 2003 on environmental assessment. This assessment is understood as a prevention tool enabling environmental aspects to be integrated into the decision-making of public plans and programmes. This process involved carrying out the necessary consultations and public information, and drawing up a comprehensive and integrated Strategic Environmental Study.

The process of drafting the study started on 30 April 2019 with the request to launch the Strategic Environmental Assessment. The public consultation phases, in the field of strategic environmental assessment, started on 9 May 2019 by consulting the public administrations concerned and interested persons by the environmental body. Subsequently, on 22 January 2020, the Strategic Environmental Study of the PNIEC was published on the website of the Ministry for the Ecological Transition and the Demographic Challenge, and a public consultation was launched to collect comments on the Strategic Environmental Study, which ran until 11 June 2020.

As a result of the environmental assessment process, following consultations and relevant public information, and incorporating comments from the bodies, public administrations concerned and interested persons and from the environmental body, the Resolution of the Directorate-General for Environmental Quality and Assessment setting out the Strategic Environmental Declaration (SAD) of the National Integrated Energy and Climate Plan 2021-2030 was issued on 30 December 2020.

#### Strategic Environmental Study

The central document for the strategic environmental assessment of the NECP is the Strategic Environmental Study (ESAE), which sets out, throughout different chapters, the general characteristics of the NECP; the environmental issues relevant to the NECP; the environmental protection objectives to be covered; the criteria underlying the policy choice adopted in the NECP; the significant environmental effects resulting from its application; the preventive, corrective and compensatory environmental measures to accompany the deployment of the policies and measures of the Plan; and the environmental monitoring programme.

The purpose of the **Environmental Monitoring Programme (PVA)** is to monitor the effects on the environment of the implementation of the measures 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 necessary. As established in

---

<sup>128</sup>As expressed by the European Commission in its assessment of the October 2020 NECP, recommending that it be used to address the configuration of the Spanish PRTR.

both the ESAE and the DAE, this monitoring is being carried out in accordance with the environmental monitoring measures and indicators proposed in both documents.

In addition, following the recommendations of the DAE, working groups have been set up to draw up **information guides to good practice** that systematise all environmental criteria, including the possibility of proposing common criteria to serve as a reference for regional legislation and the respective municipal regulations. In particular, the EAD suggests producing guides addressing these specific aspects:

- **Guides to good practice** reflecting the practices to be developed for the correct conservation and improvement of the soil, both for the environmental restoration of the areas occupied by the deployment of renewable energy installations and for the dismantling of thermal and nuclear power stations.
- **Guide to environmental guidelines on the deployment of renewable energies in the marine environment** or the construction/installation of infrastructure associated with the measures of the NECP in the marine environment.
- **Guide for the integration of renewable installations for self-consumption and distributed generation in the urban landscape and rural areas**, in order to propose common criteria to serve as a reference for regional legislation and the respective municipal ordinances.
- **Guide for the integration of energy renovation and self-consumption facilities into historic and cultural heritage buildings** and their surroundings, as well as into the buildings of the designated monumental ensembles.
- **Methodological guide** for drawing up studies assessing the synergistic and cumulative effects of projects for renewable energy installations.

To address the above issues, the following guides have been published to date, which address most of the aspects outlined above: To address the above issues, the following guides have been published to date, which address most of the aspects outlined above:

**Table 3.5. Information guides to good practice drawn up**

Quick	Publication date
<b>Guide to the preparation of environmental impact studies for solar photovoltaic projects and their evacuation infrastructure</b> <sup>129</sup>	March 2022
<b>Guide to the implementation of the integrated National Energy and Climate Plan in the field</b> <sup>130</sup>	October 2021
<b>Guide to guidance to municipalities for the promotion of autoconsumo</b> <sup>131</sup>	May 2022
<b>Good practice guide for the installation of renewable energy infrastructure and equipment and their potential impact on cultural heritage</b> <sup>132</sup>	November 2022
<b>Recommendations for launching an energy community local</b> <sup>133</sup>	March 2023

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

In addition to the guides indicated as produced in the table above, progress has been made at the time of drafting this draft to address the remaining issues. The Guide to the preparation of environmental

<sup>129</sup>[https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/Topic/Guidebetatephotovoltaicassgea\\_tcm30-538300.pdf](https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/Topic/Guidebetatephotovoltaicassgea_tcm30-538300.pdf)

<sup>130</sup><https://redciudadesclima.es/sites/default/files/PNIEC/index.html>

<sup>131</sup> Last version: [https://www.idae.es/sites/default/files/documentos/publicaciones\\_idae/2022-12-02\\_Guia\\_Autoconsumo\\_tamis\\_v.3.pdf](https://www.idae.es/sites/default/files/documentos/publicaciones_idae/2022-12-02_Guia_Autoconsumo_tamis_v.3.pdf)

<sup>132</sup> <https://icomos.es/wp-content/uploads/2022/10/GUIA-BP-RENOVABLES-Y-PATRIMONIO-CULTURAL-ICOMOS-ESPANA.pdf>

<sup>133</sup><https://redciudadesclima.es/sites/default/files/2023-03/Guia%20Comunidad%20Energetica.pdf>

impact studies for wind energy infrastructure projects is in the draft phase. Progress is also being made in drawing up the Methodological Guide for drawing up studies assessing the synergistic and cumulative effects of projects for renewable energy installations. In this regard, special sessions have to be held to address the cumulative and synergistic effects of the concentration of renewable installations in the framework of the Network of Environmental Authorities. 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. Similarly, the guide for carrying out environmental impact studies for wind energy infrastructure projects is in the process of being drawn up.

### **Environmental measures for the development and deployment of policies and measures compatible with the conservation of biodiversity, the environment and life**

The analysis of the interactions of the policies and measures of the NECP with the environment requires the identification and classification of the main components of the NECP according to how they interact with the territory and the environment.

As part of the strategic environmental study of the NECP, a chapter setting out good environmental practices for the deployment of the various technologies is formulated, with the aim of ensuring that projects include environmental measures that are preventive, corrective and compensatory, with the aim of reducing the effects on the environment.

The preventive and corrective measures included in the ESAE and supplemented in the EAD are divided into:

- Policy measures: the implementation of which will be carried out by the substantive body.
- Recommendations at project level: good environmental practices so that the other administrations and project promoters derived from the NECP take account of their planning and implementation.

Policy measures include the specific case of the **promotion of general environmental criteria for renewable energy installations**. MITECO, through the State Secretariat for the Environment, has planned instruments to promote the environmental adequacy of the location of installations. These include the production, publication and dissemination of environmental Zonification maps for renewable energy: Wind and Photovoltaica<sup>134</sup>.

The policy measures proposed by ESAE are grouped into 3 categories:

1. Cross-cutting actions
2. Deployment and integration of renewable energy
3. Sectoral transformations

Cross-cutting actions include the development of economic, social, territorial and knowledge actions or transformations aimed at fostering the energy and climate transition that do not relate to specific technologies or sectors. As part of these actions, the ESAE proposes the incorporation of lines of environmental research that improve the environmental integration of the measures in the NECP and the promotion of initiatives to offset the carbon footprint and the circular economy. The measures under this category have no negative impacts and many of them seek to improve the territorial or social integration of the NECP.

---

<sup>134</sup>[https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental/zoning\\_environmental\\_energias\\_renovables.aspx](https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental/zoning_environmental_energias_renovables.aspx)

The deployment and integration of renewable energies, especially electricity generation, is further developed at strategic level, which implies transformations with the highest territorial and environmental impacts 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, hydroelectric, geothermal, marine, biomass, biogas and biofuels) for the location of renewable energy installations; for the integration of renewables into the electricity system and for the progressive reduction of energy from non-renewable sources.

Policy measures for sectoral transformations address those changes affecting transport, the residential and service sector, industry, the agricultural sector and waste management. The impact of these measures is mostly positive and the few negative effects identified are outweighed by their overall positive impact, so no corrective or compensatory action is needed.

Preventive, corrective and compensatory measures for potential negative effects are based on the identification of the potential impacts on the environment resulting from the implementation of the policies and measures of the NECP. Therefore, when implementing and implementing the actions stemming from the policies and measures proposed in Chapter 3 of this document, it will be necessary to take into account what is included in 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 negative effects arising from the implementation of the NECP, and to seize the opportunities offered by the Plan itself to promote improvements in the environment.

### 3.6.2. Gender mainstreaming

#### Measure 6.1 Gender perspective

##### a) Description

Gender equality is a key cross-cutting factor in the green transition. Therefore, one of the Spanish Government's commitments 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, inter alia, of the Law on Climate Change and Energy Transition; the Government Declaration on the Climate and Environmental Emergency; of the PNACC 2021-2030; the Long-Term Decarbonisation Strategy 2050 (LTS); the Just Transition Strategy (JTS); the Energy Storage Strategy (SEA); the Road Map of Self-Consumption (HRA); the First Circular Economy Action Plan (CEAP); and PRTR. In addition, environmental mainstreaming is part of the strategic framework for equality policies. Therefore, measures under the Strategic Plan for Effective Equality of Women and Men 2022-2025 (PEIEMH) integrate ecological and social sustainability.

This measure of the NECP is therefore aimed at strengthening gender mainstreaming in all the measures of the NECP that have a direct or indirect impact on people, primarily employment in the energy sector, but also in leadership positions, entrepreneurship and innovation in this sector, as well as in the analysis and promotion of sustainable patterns of energy production and consumption. As a starting point, the International Energy

Agency (IEA) has noted in various reports<sup>135</sup> (and in its new gender and energy data portal<sup>136</sup>) that significant gender gaps persist in this sector, where the under-representation of women is higher than in all other economic sectors, not only in terms of employment, but also in entrepreneurial leadership, entrepreneurship and innovation. Closing these gaps is key to achieving more innovative and inclusive solutions in the energy transition. In fact, the gender gap in renewable energy employment is smaller: according to the IRENA report (2022) on gender perspective in solar photovoltaic energy for women<sup>137</sup>, women account for 40 % of full-time employment in this sector, above 32 % for all renewables, and almost double that for wind (21 %) and oil and gas (22 %), but in management positions the gap is greater than in employment. MITECO's report and database on *Green Entrepreneurship for Women and Women's Entrepreneurship in Rural Areas*<sup>138</sup> that female and male entrepreneurship in renewable energy is barely representative in Spain, but in paid employment in this sector women account for 36 % of the total, below 48 % of women in all paid employment in all economic sectors. It also notes that the social economy's role in green or rural entrepreneurship, cooperatives, is extremely small for women and men.

There is a growing case for strengthening the close relationship between gender equality and verde employment<sup>139</sup>. Action-oriented commitments include the current UNFCCC Gender Equality Plan and the Equal by 30 campaign, which the Spanish Government plans to join, which is a joint initiative of the Clean Energy Ministerial (CEM) Forum and IEA with a horizon of 2030<sup>140</sup>.

#### b) Objectives addressed

Achieve a balanced representation of women and men at all levels and in all areas of the transition to a climate-neutral economy, with full, equal and meaningful participation of women, including access to benefits resulting from energy and climate investments and reforms.

Integrate a gender perspective in the energy transition, so that the policies and measures of this Plan are designed to reduce the gender gap in energy uses and women's participation in the energy sector.

#### c) Mechanisms for action

The positive gender impact of energy and climate investments and reforms shall be enhanced through the following policy mechanisms:

- **Improve 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 public policies and measures that promote the reduction of the gender gap.
- **Progress in the implementation of the energy and climate gender equality axes and measures already included in the current national policy framework (such as ETJ, PNACC, LFS, EAE, HRA, PRTR and PEIEMH):**  
To this end, gender analysis of the patterns of investment, research and innovation, employment,

<sup>135</sup> *World Energy Employment* (available at <https://www.iea.org/reports/world-energy-employment>). Understanding *Gender Gaps in Wages, Employment and Career Trajectories in the Energy Sector*, carried out with data from Spain (2006-2018), Portugal (2002-2017), France (2002-2018), Germany (2002-2018), and Austria (2000-2018), available at <https://www.iea.org/articles/understanding-gender-gaps-in-wages-employment-and-career-trajectories-in-the-energy-sector>.

<sup>136</sup> <https://www.iea.org/data-and-statistics/data-tools/gender-and-energy-data-explorer>

<sup>137</sup> *Solar PV – A Gender Perspective* from the *Gender Perspective Series*. Available at [https://www.irena.org/media/Files/IRENA/Agency/Publication/2022/Sep/IRENA\\_Solar\\_PV\\_Gender\\_perspective\\_2022.pdf](https://www.irena.org/media/Files/IRENA/Agency/Publication/2022/Sep/IRENA_Solar_PV_Gender_perspective_2022.pdf)

<sup>138</sup> <https://www.miteco.gob.es/es/ministerio/planes-estrategias/igualdad-de-genero/emprendimiento-mujeres-verde-rural-2023.aspx>

<sup>139</sup> 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:

[https://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/---emp\\_ent/documents/publication/wcms\\_860569.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_860569.pdf)); ILO and EC (2023) *Green jobs, an opportunity for women in Latin America* (accessible from [https://www.ilo.org/americas/sala-de-prensa/WCMS\\_870976/lang-es/index.htm](https://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* (at [https://www.oecd-ilibrary.org/environment/empowering-women-in-the-transition-towards-green-growth-in-greece\\_a9eace6e-en](https://www.oecd-ilibrary.org/environment/empowering-women-in-the-transition-towards-green-growth-in-greece_a9eace6e-en));

*Empowering Women to Power the Green Transition* (at <https://oecd.cogito.blog/2023/03/08/empowering-women-to-power-the-green-transition/>)

<sup>140</sup> [https://unfccc.int/sites/default/files/resource/cp2019\\_L03S.pdf](https://unfccc.int/sites/default/files/resource/cp2019_L03S.pdf) and <https://www.equalby30.org/en>

entrepreneurship, production, consumption, storage, mobility, social acceptance, citizen participation, etc. that relate to energy and climate, in particular renewable energy, is key to aligning public policies and making them more effective and efficient, enhancing synergies that accelerate both positive impacts towards climate 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 to reduce participation gaps, pay gaps and vocational training initiatives.

- **Gender mainstreaming in the design of reforms and investments.**

To this end, the work stream of the aid lines linked to the PRTR will continue, including in the regulatory bases the measures implemented to close the gender gap as a positive externality.

- **Promoting gender equality in employment, leadership, entrepreneurship and innovation:**

In order to close the gender gaps in employment (including pay), leadership positions, entrepreneurship and innovation, especially in the energy sector, beyond the current national framework mentioned above, the commitment 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 policy planning**

The public sector should apply a gender perspective in public transport planning to ensure adequate accessibility to mobility and transport infrastructure and services.

**d) Bodies responsible**

General State Administration, Autonomous Communities and Local Authorities

### 3.6.3. National Climate Change Adaptation Plan

#### Measure 6.2 Integration of climate change adaptation objectives

##### a) Description

Spain has a high potential for renewable resources, which places it in a favourable position to make a transition to an emission-free energy system. However, the potential impacts of climate change need to be considered throughout this transition process, as it is in a particularly vulnerable region. 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 floods and higher maximum flows. In addition, adverse climatic events, such as heat waves, or coastal phenomena that could affect coastal energy installations are expected to be more frequent.

The objectives and lines of action on adaptation to climate change in Spain are set out in the PNAC<sup>141</sup>, including areas of work such as energy, mobility and transport, water resources, coasts and the marine environment, industry, forests, agriculture and food.

The NAPCP contributes to the objectives of the NECP and its five dimensions through the concrete measures integrated in its Work Programmes (WP) and the NECP contributes to the NAPCP through some of its measures, establishing a synergistic flow in both directions that reinforces both plans and ensures a 'tested' transition from climate change.

Specifically in the field of energy, the **objectives set out in the PNACC** are:

- A. Improve knowledge of the impacts of climate change on renewable energy production potentials and translate results into energy planning (see table, Renov potential).
- B. Improve knowledge of the impacts of climate change on energy demand and identify measures to prevent or limit peaks in demand, especially those associated with heat (see table, ENER demand).
- C. Improve knowledge of the potential impacts of climate change on the functionality and resilience of energy generation, transmission, storage and distribution systems and specify adaptation measures to prevent or reduce identified risks (see table, SIST Resilience).
- D. Identify risks 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 following table in which the most significant relationships have been shaded.

<sup>141</sup><https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/plan-nacional-adaptation-change-air-conditioning/default.aspx>

			Potential RENOV	Applicatio n ENER	Resilienci to SIST
DECARBONISATION DIMENSION	Measure d 1.1.	Development of renewable energy compatible with biodiversity and ecosystem protection			
	Measure d 1.2.	Renewable energy development compatible with territory and rural development			
	Measure d 1.3.	Development of new electricity-generating installations using renewable energy			
	Measure d 1.4.	Development of innovative renewable energy installations			
	Measure d 1.5.	Energy storage			
	Measure d 1.6.	Demand management and flexibility			
	Measure d 1.7.	Adaptation of electricity grids for the integration of renewables			
	Measure d 1.8.	Development of self-consumption with renewables and distributed generation			
	Measure d 1.9.	Development of new hydroelectric storage capacity			
	Measure d 1.10.	Decarbonisation of the industrial sector			
	Measure d 1.22.	Unique projects and strategy for sustainable energy on islands			
	Measure d 1.31.	Building life cycle analysis			
	ENERGY EFFICIENCY DIMENSION.	Measure d 2.1.	Low emission zones and modal shift measures		
Measure d 2.2.		Modal shift in freight transport with a higher presence of rail			
Measure d 2.3.		Renewal of the rolling stock of means of transport and efficiency in management			
Measure d 2.4.		Improving the efficiency and sustainability of ports			



	Measure d 2.5.	Promotion of electric vehicles			
	Measure d 2.6.	Improvements in technology and process management systems in non-energy intensive industries			
	Measure d 2.7.	Improvements in technology and process management systems in energy intensive industries			
	Measure d 2.8.	Energy efficiency in existing buildings in the residential sector			
	Measure d 2.9.	Renewal of residential equipment			
	Measure d 2.10.	District heating and cooling networks			
	Measure d 2.11.	Energy efficiency in buildings in the tertiary sector.			
	Measure d 2.12.	District heat and cooling networks in the tertiary sector			
	Measure d 2.13.	Energy efficiency in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure			
	Measure d 2.14.	Energy efficiency on farms, irrigation communities and agricultural machinery			
	Measure d 2.15.	Energy efficiency in the fisheries sector			
	Measure d 2.17.	Public sector: accountability and energy efficient public procurement			
	<b>ENERGY SECURITY DIMENSION.</b>	Measure d 3.1.	Plan + Energy Security		
Measure d 3.2.		Maintenance of minimum safety stocks of petroleum products and gas			
Measure d 3.3.		Reducing energy dependency on islands			
Measure d 3.4.		Recharging points for alternative fuels			

	Measure d 3.5.	Boosting regional cooperation			
	Measure d 3.6.	Deepening contingency plans			
	Measure d 3.7.	Planning for the safe operation of a decarbonised energy system			
	Measure d 3.8.	Strategic raw materials for the energy transition			
<b>DIMENSION INTERNAL ENERGY MARKET</b>	Measure d 4.4.	Increasing electricity interconnection in the Internal Market			
	Measure d 4.5.	Electricity Transmission Network Development Plan 20212026			
	Measure d 4.6.	Integration of the electricity market			
	Measure d 4.8.	Access to data			
	Measure d 4.9.	Gas market integration			
<b>R &amp; I &amp; c dimension</b>	Measure d 5.1.	Strategic action in climate, energy and mobility			
	Measure d 5.2.	Implementation of the SET-Plan			
	Measure d 5.3.	Complementary plans in the energy and climate sectors			
	Measure d 5.4.	Scientific and technical infrastructure in the energy and climate sectors			
	Measure d 5.7.	Regulatory changes to facilitate research and innovation			
	Measure d 5.9.	Shared renewable energy research centres			
	Measure d 5.12.	Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition			

## Technology Platforms and Alliance Action

### 5.13. ALINNE

A clear example of the contribution of the NECP to the NAPCP can be found in measures such as ‘Low-Emission Areas’ or ‘Energy efficiency in existing buildings in the residential sector’, the implementation of which makes a direct contribution to adaptation as they reduce the impact of heat waves on the population. At the same time, it is essential that these measures are developed with adaptive criteria to ensure their feasibility and functionality in a climate change context.

On the other hand, the proposed measures to improve agricultural and forestry sinks include actions aimed at increasing the levels of soil organic carbon, which results in improving soil structure by making soils more efficient in the capture and retention of moisture and in protecting against erosion, thus contributing to improving the resilience of agricultural and forestry soils.

Conversely, the PNACC promotes the analysis of energy resources likely to 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) Mechanisms for action**

The PNACC is developed through **Work Programmes (WP)**. The financial **resources available** for their development include:

- ☺ The PIMA Funds from auction revenues of allowances will finance a variety of measures in the TP, through two main modalities: adapta PIMA Funds, managed by various units of the general state administration and territorial PIMA funds (managed through the Autonomous Communities subject to the agreement of the Sectoral Conference of the Environment).
- ☺ The funds from the PRTR. Given the weight given to the fight against climate change in the aforementioned Plan and the combination of its objectives with the PNACC 2021-2030, the PRTR funds will undoubtedly have a bearing on the financing of the measures provided for in the PNACC WP through several of its components, such as component 1 ‘Sustainable, safe and connected mobility shock plan in urban and metropolitan environments’, component 2 ‘Plan for housing rehabilitation and urban regeneration’, component 4 ‘Conservation and restoration of ecosystems and their biodiversity’, component 5 ‘Preserving coastal space and water resources’ and component 6 ‘Sustainable, safe and connected mobility’, among others.
- ☺ In addition, the various departments responsible for the development of the measures included in the Work Programme will sometimes use their own resources to implement them.

The main measures of the PNACC WP, grouped by work area, contributing to one of the five dimensions of energy included in the NECP are listed below.

#### Water and water resources

Water and water resources play a key role in the energy transition, in hydroelectric power generation, power plant cooling and other energy production applications. These uses can be compromised by the reduction of water resources associated with climate change.

In this regard, the PNACC incorporates a series of measures, which are 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:

#### ***A study on water-energy links and the incorporation of their results into energy planning***

This measure has two objectives: on the one hand, to study the effects of climate change on water demands for energy use and, on the other hand, to study the energy requirements of water services.

As a result of climate change, changes in precipitation patterns, reduced flow rates, increased frequency and intensity of droughts and increased water temperature will have an increasing impact on power generation, both

hydropower and from generation systems that require the use of water for cooling. It is therefore necessary to analyse these risks and integrate them into energy planning. Water planning and management will also require new energy requirements related to the increase in the use of alternative water sources, such as desalination or reuse, and should therefore be taken into account in energy planning, promoting their coverage through renewable energy sources.

This measure, linked to **decarbonisation and energy efficiency**, improves knowledge about the availability of water resources for renewable hydropower generation or for other energy-demanding water installations, and about the evolution of energy demand for water-related uses.

***The development of climate change adaptation plans in river basin districts foreseen in the next cycle of water planning (2022-2027)***

River basin organisms shall develop a climate change adaptation plan within their respective RBDs, including a risk assessment and identification of adaptation measures to reduce them. This planning will facilitate rational water use and improved resilience of water infrastructure in a climate change scenario. This measure will therefore contribute to the energy security dimension by improving the sustainability of water use in energy production.

***The development of actions aimed at improving the status of surface water bodies and associated aquatic ecosystems;***

This measure aims to implement at least 80 actions to improve the status of surface water bodies and associated aquatic ecosystems, including river restoration and green infrastructure projects, improving the hydromorphological conditions of water bodies and nature-based solutions. These actions cover improving river connectivity (longitudinal and transverse) and restoring the riverside forest, among others.

This measure can contribute to the energy dimension of **decarbonisation**, through the reduction of greenhouse gases through the restoration of rivers and wetlands, and their riverside vegetation, strengthening their role as carbon sinks.

Agriculture and food

Some measures in this area of work of the PNACC contribute to food security by improving the adaptation of agriculture to the impacts of climate change. It should be noted that:

***The implementation of communication actions on food, health and sustainability from a climate change perspective***

This measure promotes healthy diets compatible with sustainable and integrated local food production and the reduction of food waste. The aim is to strengthen the sustainability of the food system and the adaptation to climate change of rural areas, promoting short marketing channels, the bioeconomy, the circular economy and local and organic farming, among other strategies, which contribute to reducing the carbon footprint and increasing the resilience of the sector.

Forestry sector

A combination of factors, including their geographical location, straddling European and African continents, 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 tree and supra-tree forest formations, structural and functional modifications, changes in certain forest health parameters, increased vulnerability to extreme weather events and 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 risks 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 CO<sub>2</sub> capture and storage capacity and thus on mitigation objectives in sinks, contributing to the **decarbonisation dimension**. Incorporating the adaptation perspective is

indispensable to ensure the long-term maintenance of forest ecosystems and thus underpin mitigation policies for natural sinks.

In order to address this issue, the PNACC TP states:

***Revision of the main forest planning instruments and the Spanish forestry sector incorporating recent knowledge of projections, impacts and adaptation to climate change***

The PNACC proposes, as a first step, the revision of the main forest planning instruments and the Spanish forest sector in order to integrate the adaptation perspective and ensure the coherence of forest-related policies, creating conditions for the multifunctional potential of Spanish forests to be managed in a sustainable and balanced way, allowing forests to provide a set of vital services that are indispensable.

***Actions for 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 that contribute 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 numerous co-benefits, including climate change mitigation.

***Actions for the mobilisation of actors and sectoral integration in forest fire prevention and control***

Heat waves or groups of days with extreme temperatures and low relative humidity are directly associated with the occurrence of large forest fires, as they result in greater predisposition of fuel 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 to manage landscapes to make them more resilient and resilient to a higher incidence of fires. The integration of sectoral policies and the involvement of actors with responsibility in the forest area – as well as the promotion of agrosilvopastoral systems and traditional uses such as pastoralism – from a perspective of expected climate change and fire risk, are a good mechanism for implementing adaptive measures in the face of increased fire hazards.

Energy infrastructure in coastal areas:

Part of the strategic energy infrastructure is located in coastal areas. The PNACC WP contributes to the **internal energy market dimension and to energy security** 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 indirectly contribute to decarbonisation by facilitating the safe implementation of renewable energy installations**, such as selecting the most suitable areas for installing the auxiliaries required for the production of, inter alia, offshore wind or ocean energy.

***Development of adaptation initiatives in the public maritime land 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 the strengthening of the coastline makes it possible to improve the adaptive capacity and resilience of the coastal area itself as a basis for activities essential to the energy transition.

***A series of methodologies and tools to manage climate change risks in coastal space***

This measure makes it possible to make available to both public and private sectors with strategic interests in coastal areas tools, online sights or methodologies for coastal risk analysis in the face of climate change, which make it possible to improve knowledge of the locations best suited to ensure the viability of the facilities throughout their lifetime.

In addition, the WP promotes the ***drafting of climate change adaptation plans for key elements of the coastline such as:***

- ☺ Adaptation plans for state-owned ports.

- ☺ Adaptation plans in DPMT sites attached to the Autonomous Communities or ports transferred to them.
- ☺ Maritime Spatial Planning Plans (MEPP).

Adaptation plans in state-owned ports contribute to **energy security** as they allow import and commercial activities related to the different energy sources with an adaptive planning vision and can serve as a safeguard for energy installations.

Royal Decree 150/2023 of 28 February 2014 approving the maritime spatial plans for the five Spanish marine districts integrated adaptation to climate change, with climate change adaptation measures being one of the activities and interests considered to be of general interest in the MEPPs, which means that their objectives are a priority. In order to meet the adaptation objectives, an effort has been made to integrate climate change aspects into the various stages of the preparation of the plans, and especially into the MEOP measures for the first cycle. For them, climate change has been considered within each of the measures laid down in the MEOP and details how it will be considered during the implementation of these measures.

In this regard, integrating climate change adaptation into MEOP plays a key role both in **energy security** and in the **decarbonisation** dimension. These plans set out the spatial and temporal distribution of existing and future activities and uses of maritime space, including installations for the production of energy from renewable sources.

#### Transport infrastructure – roads, railways, airports and ports:

Transport infrastructure plays a crucial role in the energy transition. The safety of the facilities, the operability and 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 taking into account the climate scenarios that can arise over their lifetime and implementing adaptation measures.

The PNACC provides for a series of actions to advance these objectives, such as:

***Reviewing climate variables affecting the design and functionality of infrastructure*** – roads, railways, airports and ports – and the thresholds that interfere with their operability.

***The identification, analysis and assessment – in the light of climate change projections – of regulations, instructions and calculation and design standards for infrastructure*** – roads, railways, airports and ports – and ancillary buildings and facilities for transport.

***The review, assessment and reinforcement of emergency protocols, contingency plans and alert systems for transport infrastructure considering the risks arising from climate change.***

***Assessing the vulnerability of existing transport networks and systems*** and developing 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 supporting resilient infrastructure systems that enable a safe modal shift in transport, for example through improvements in rail infrastructure planning and design, and energy efficiency through the incorporation of climate change adaptation criteria into infrastructure regulations, instructions and calculation and design standards.

#### Energy

The PNACC includes a series of energy-specific measures that allow action to be taken on the risks affecting the various components of the energy system, affecting the dimensions of **decarbonisation**, and **energy efficiency and security**:

***The Water-Energy Links study discussed above and the analysis of hydropower potential 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.

***One of the objectives of analysing the evolution of electricity demand (and especially peak demand) in a climate change context*** is to take into account projections of changes in electricity demand, as a result of climate change, in order to measure the capacity and flexibility of the electricity system to cope with peak demand.

### Research and innovation

The main objective of this area of work of the PNACC is the integration of adaptation into future science, technology and innovation strategies and 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 climate change risk estimation and informed decision making for adaptation. The main contribution of this area is therefore to the research, innovation and competitiveness dimension of the NECP. Spotlight on:

***The development of a guidance document for the preparation of assessments of the impacts and main risks of climate change***, which will strengthen the methodological bases for identifying vulnerabilities in any sector, as a stage prior to the implementation of measures to adapt to climate change.

### Environmental assessment

The Environmental Assessment procedure is a key tool to ensure the resilience and viability of projects in the field of energy transition in general and in particular those related to renewable energy production.

As stated in Law 21/2013 on environmental assessment, environmental impact studies must include the identification and assessment of the impact of the project on climate and climate change. This analysis should take into account the nature and magnitude of the greenhouse gas emissions associated with the projects (**mitigation**) and the risks and vulnerability of the projects to climate change to ensure their **adaptation**. All this to develop **climate-resilient projects with a high level of environmental protection**.

This procedure for environmental assessment of projects promotes the implementation of the “Technical guidelines on climate proofing of infrastructure for the period 2021-2027”.

The observation of this document is important **for carrying out the calculation of the carbon footprint** taking into account all phases of the infrastructure life cycle. The calculation of the carbon footprint associated with projects is ultimately intended to propose alternatives to reduce and offset the carbon footprint, so the results should be translated into measures for this purpose and thus contribute to **the decarbonisation dimension**.

This document also guides **the vulnerability assessment and climate risk analysis** that are the basis for identifying, assessing and implementing climate change adaptation measures of projects and ensuring their operation under different climate change scenarios. This analysis of risks and vulnerability to climate change will result in the most appropriate climate change adaptation measures.

Furthermore, this procedure promotes consistency with the ‘Recommendations for the deployment and integration of renewable energies’ included in the **Strategic Environmental Study** of the National Integrated Energy and Climate Plan (NECP), referred to in this same chapter.

### City, urban planning and construction

The PNACC also promotes coordinated urban and peri-urban climate change adaptation and mitigation measures through the PIMA Climate Change. This programme – launched in 2020 – promotes and supports adaptation to climate change in urban and peri-urban **areas, enhancing synergies between climate change mitigation and adaptation strategies** at local level. For example, the adaptation of public buildings to prevent excess heat or the implementation of nature-based solutions aimed at preventing climate change risks are adaptation objectives that contribute to mitigation by reducing the use of energy needed for air conditioning.

#### **c) Bodies responsible**

Water:

- ♦ MITECO
- ♦ Hydrographic Confederations
- ♦ Biodiversity Foundation

Forestry sector:

◊◆◆◆□□□□◆◆◆◆ Communities

- ♦ MITECO
- ♦ Biodiversity Foundation
- ♦ Ministry of the Interior

#### Energy infrastructure in coastal areas:

- ☺ Autonomous Communities
- ☺ MITECO
- ☺ State Ports Public Authority

#### Transport infrastructure:

- ☺ Ministry of Transport, Mobility and the Urban Agenda, with public administrations owning infrastructure and public entities.

#### Energy

- ☺ MITECO
- ☺ Biodiversity Foundation

#### Urban Planning

- ☺ Ministry of Transport, Mobility and Urban Agenda
- ☺ MITECO
- ☺ Local authorities

#### Environmental assessment

- ☺ MITECO.



### 3.6.4. Synergies with other plans

#### The Recovery and Resilience Facility

##### Measure 6.3 Recovery and Resilience Facility

###### a) Description

The European Council approved on 21 June 2020 the creation of the NextGenerationEU programme, the largest economic stimulus instrument ever financed by the European Union, emerging in response to the unprecedented coronavirus crisis, with an investment of EUR 750.000 billion. Thanks to this instrument, 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, governed by Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021, the main objective of which 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 a total of EUR 140.000 billion between 2021 and 2026, of which around EUR 70.000 billion will be in the form of transfers. To channel these funds, Spain has drawn up the PRTR. This plan provides for 39.7 % of these funds to be allocated to the green transition, which is the main driver for implementing the plan, and confirming Spain's commitment to transforming the economy in order to promote a sustainable future. In addition, all measures must comply with the principle of 'do no significant harm to the environment'.

The additional resources allocated by Spain under the Recovery and Resilience Facility not mobilised in the first stage of implementation of the PRTR are structured through the Addendum to the PRTR, giving continuity to the process of recovery and modernisation of the Spanish economy, with the aim of strengthening Spain's and Europe's strategic autonomy in the energy, agri-food, industrial, technological and digital fields. The addendum, approved by the Council of Ministers on 6 June 2023, provides for more than EUR 10.000 million in grants and up to EUR 84.000 million in loans. These resources will, inter alia, enable the continuation of exceptionally successful support programmes, such as those related to self-consumption and storage behind meter or renewable hydrogen, as well as to open new strategically essential lines such as those related to industrial value chain support linked to the energy transition. This proposal for an addendum has already been formally sent to the Commission, thus initiating the assessment period provided for in the regulation governing the Recovery and Resilience Facility.

###### b) Objectives addressed

NextGenerationEU aims to respond jointly and in a coordinated manner in the EU to the social and economic crisis caused by the global COVID-19 pandemic, and to help repair and counter the damage caused by the pandemic.

At the heart of this instrument, the Recovery and Resilience Facility aims to foster the Union's economic, social and territorial cohesion 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 integration of other Union policies, such as the implementation of the European Pillar of Social Rights, the acceleration of the green transition, the achievement of the Union's 2030 climate targets and the achievement of the climate-neutrality objective by 2050; the digital transition. The actions resulting from the Facility shall contribute to the process of upward economic and social convergence, restoration and the promotion of sustainable growth and integration of the Union's economies, fostering the creation of quality jobs, and contributing to the Union's strategic autonomy.

The PRTR is the document prepared by Spain to benefit from the Recovery and Resilience Facility, pursuant to Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 governing the Recovery and Resilience Facility. The purpose of the PRTR is threefold: boost activity and job creation to counter the impact of the pandemic in the short term, support a structural transformation process to increase potential growth in the medium term and strengthen resilience in the long term, moving towards more sustainable and inclusive development. This Plan is structured

around four cross-cutting axes, which will underpin the transformation 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, digital transformation, gender equality and social and territorial cohesion. These four axes guide the ten lever policies that determine the future development of the country, including leveraging policies I: Urban and rural agenda, fight against depopulation and development of agriculture and III: Just and inclusive energy transition. Thus, one of the objectives of the PRTR is 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 creating greater resilience in the economy in the medium and long term.

With regard to the Addendum, it represents an update of the PRTR which incorporates three new features: (1) allocate the additional transfers corresponding to Spain, amounting to an additional subsidy of EUR 7.700 million; (2) allocate the Recovery and Resilience Facility loans, where Spain will be able to request up to EUR 84.000 billion from the European Commission; and (3) allocate REPowerEU funds, which aim to save energy, increase clean energy production and diversify Europe's energy sources.

### c) Mechanisms for action

The PRTR is structured around 10 leverage policies and 30 components that articulate an important reform and investment agenda with the horizon 2023. Each component focuses on a specific challenge or objective and includes reforms and investments that, in a coherent and complementary manner, contribute to achieving those objectives or overcoming the challenges. For all of them, milestones and targets, expected results, number of beneficiaries as well as the detailed cost of each element are identified.

Specifically, in relation to this NECP, two of the leverage policies have a direct link with the policies and measures described in Chapter 3 of this document. These are in particular lever policies I: Urban and rural agenda, fight against depopulation and development of agriculture, with EUR 14.407 million, and III: Just and inclusive energy transition, with a budget of EUR 6.385 billion. Specifically, the components related to this NECP are the following:

- Leverage policy I: Urban and rural agenda, fight against depopulation and development of agriculture.
  - ☞ □○□□□■♣■◆ 1: Action plan for safe, sustainable, and connected mobility in urban and metropolitan areas
  - ☞ □○□□□■♣■◆ 2: Housing rehabilitation and urban renewal plan
- Leverage policy III: Just and inclusive energy transition.
  - ☞ □○□□□■♣■◆ 7: Deployment and integration of renewable energy
  - ☞ □○□□□■♣■◆ 8: Electricity infrastructure, promotion of smart grids and deployment of flexibility and energy storage
  - ☞ □○□□□■♣■◆ 9: Renewable hydrogen roadmap and its sectoral integration –
  - ☞ □○□□□■♣■◆ 10: Fair transition strategy

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 driving 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 mobility management tools. This component provides for a clash plan with measures aimed at the city's own fabric and infrastructure, as well as boosting and optimising urban and metropolitan transport, including encouraging electrification of mobility and improving air quality.

The main objectives of Component 2, with a budget of EUR 6.820 million, are to promote the renovation of the building stock in Spain, in line with the European Renovation Wave, and to increase the social rental housing stock in energy-efficient buildings, helping to activate this sector and generate employment and activity in the short term. In addition, as a specific objective, the aim is to achieve significantly higher energy renovation rates than the current ones that allow the achievement of the renovation targets set out in the National Integrated Energy and Climate Plan (NECP) and in the Long-term Strategy for Energy Renovation in the Building Sector in Spain (ERESEE) to be brought forward.

Component 7, endowed with EUR 3.165 million, aims to increase the use of renewable energy in 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, enhances social participation in this area and maximises the proper environmental and social integration of renewables; the establishment and consolidation of the renewable industrial value chain; support for the development and innovation of renewable generation technologies or the integration of renewable generation into end uses, and the development of skills and knowledge that contribute to harnessing the employment opportunities of the development of renewables.

Component 8, endowed with EUR 1.365 million, aims to ensure the transformation of the energy system to ensure that it is flexible, robust and resilient so that it can be primarily renewables-based. To this end, the gradual adaptation of network infrastructures, as well as their digitalisation and the deployment of tools providing flexibility, such as storage, will be promoted to ensure security and quality of supply.

Component 9, with a budget of EUR 1.555 million, aims to create a favourable environment for the development and deployment of renewable hydrogen as a key energy carrier in the future, around an innovative knowledge and industrial value chain based on SMEs, by supporting technology transfer, and the development of new business lines.

Finally, Component 10, with EUR 300 million, aims to minimise the economic and social impact of the transition to a green, low-carbon economy, which will entail the cessation of activities such as coal mining, coal-fired power plants and nuclear power plants as their closure is agreed.

In addition to the leverage policies 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. Among the transformation axes of the public administration is the energy transition of the administration, which takes the form of the renovation of its buildings and the use of renewable energy. 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 water, waste, energy and resource management, emissions and renewable energy in the context of the circular economy.
- 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 at increasing and accelerating investment in R & D & I in a sustainable manner and in strategic areas. It has a budget of EUR 2.689 billion.

Many of the actions included in the components are structured through the Strategic Projects for Economic Recovery and Transformation (PERTEs). In particular, leverage policy III and its components are listed in the **ERHA PERTE**. This instrument will serve as a basis for transforming the productive fabric of the energy transition, in order to develop the tools and instruments in our country to address this transformation.

In addition, as PERTEs relevant to the green transition are the **PERTE VEC**, which aims to strengthen the strategic autonomy, modernisation, decarbonisation and digitalisation of our automotive sector; **The PERTE for Industrial Decarbonisation**, which aims to support industry in its transition towards more environmentally-friendly models and processes and contribute to its decarbonisation, the **PERTE for a circular economy**, which aims to accelerate the transition to a more efficient and sustainable production system in the use of raw materials; o The **Water Digitalisation PERTE** **promotes** the use of new information technologies in the integrated water cycle, which will make it possible to improve water management, increase efficiency, reduce losses in supply networks and make progress in meeting the environmental objectives set by water planning and international regulations.

As regards energy transition, the PRTR Addendum introduces a new Component 31: 'REPowerEU strand', which aims to deepen resilience, strategic autonomy and energy security. The component, endowed with more than EUR 8.000 billion, of which more than 60 % will be implemented in the form of grants, includes 2 reforms and 6 investments:

- Reform 1 (C31.R1): Permits for renewable installations. The main objective of this reform is to improve the administrative processing of renewable electricity generation installations. The improvements consist of speeding up, simplifying and reducing administrative burdens and increasing the clarity of these procedures.

- Reform 2 (C31.R2): Consumer protection. This reform addresses measures to reduce the impact of energy costs on citizens, with a particular focus on vulnerable consumers, by introducing additional conditions for cutting supply to these consumers and for easing the conditions for accessing the social bond. It also includes the reform of the Voluntary Price for Small Consumers (PVPC), which aims to reduce the exposure of this tariff to the daily wholesale market.
- Investment (C31.I1): Renewable self-consumption, storage behind the meter and energy communities. This investment aims to strengthen and complement the actions of the PRTR targeting individual renewables, in particular self-consumption and storage behind the meter, and energy communities.
- Investment 2 (C31.I2): Renewable hydrogen: a country project. Renewable hydrogen is one of the opportunities for fossil fuel substitution in sectors identified as difficult to decarbonise, as well as one of the highly competitive technological and energy domains over the coming years. In view of the interest generated by the actions under the PRTR on green hydrogen, as well as the need to increase ambition in response to the current energy challenge, this new investment will increase ambition and strengthen the areas of action identified in Component 9 of the Plan.
- Investment 3 (C31.I3): Energy transition value chain aid and investment. This investment aims to strengthen Spanish and European strategic autonomy in the energy transition value chain by supporting productive investment in certain strategic sectors for this transition towards a net-zero economy.
- Investment 4 (C31.I4): Energy infrastructure. This investment is dedicated to the development of electricity infrastructure in the transmission system, in order to have a network of resilient and efficient infrastructure, enabling further diversification of supply as well as security of supply, enabling the deployment of strategic projects for decarbonisation.
- Investment 5 (C31.I5): Industrial Competitiveness and Sustainability Programme, PERTE for Industrial Decarbonisation (DI). It includes grants for the implementation of measures under Line A (Comprehensive Action Line for the Decarbonisation of Manufacturing Industry) and D (Support Line for the Development of Highly Efficient and Decarbonised Manufacturing Facilities) of the PERTE DI.
- Investment 6 (C31.I6): Industrial Competitiveness and Sustainability Programme (PERTE for Industrial Decarbonisation, loans). It includes transfers for the implementation of the two measures indicated in the previous investment C31.I5, as well as for Line C of the PERTE DI (Study and evaluation of the possible development of a CCD support fund).

#### **d) Relationship and synergistic effect with the NECP**

The current NECP has provided the guiding framework for the design of the reforms and investments that make up the PRTR related to the green transition, so that this Plan is a lever for a just green transition, developing the strategic capacities of the green economy. As the European Commission pointed out in the positive assessment of the October 2020 NECP, the NECP has provided a solid basis for the design of PRTR reforms and investments, in particular those labelled as investments for the green transition.

In the current context, it is essential to accelerate actions linked to the energy transition, strengthening public and private investment to reorient the production model, boosting decarbonisation, energy efficiency, renewable energy deployment and integration, the electrification of the economy, the development of energy storage, the circular economy, nature-based solutions and improving the resilience of all economic sectors. The PRTR helps to accelerate this transition process.

The table below shows the synergies between the components of the PRTR and the different measures envisaged in this NECP.

#### **e) Bodies responsible**

European Commission, General State Administration, Autonomous Communities and local authorities.

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment and integration of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategic Plan de Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		1.1. Development of renewable energy compatible with biodiversity and ecosystem protection	1.2. Renewable energy development compatible with territory and rural	1.3. Development of new electricity-generating installations using renewable energy	1.4. Development of innovative renewable energy installations	1.5. Storage or energy	1.6. Demand management and flexibility													
Decarbonisation	1.1.		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	1.2.			1	1	1		1	1	1	1									1
	1.3.							1	1											1
	1.4.								1	1	1									1
	1.5.							1	1	1										1
	1.6.							1	1	1	1					1				1

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovabl and its sectoral integration	10. Strategi a de Transición n Just	11. Modernisat ion of the Governmen t Administrat ion	12. Policy Industrial Spain 2030	14. Plan for the modernisat ion and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment t of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		1.7. Adaptation of electricity grids for the integration of renewables	1.8. Development of self-consumption with renewables and distributed generation	1.9. Development of new power storage or hydro capacity	1.10. Decarbonizaci in the industrial sector	1.11. Framework for the development of thermal renewables	1.12. Advanced renewable biofuels in transport	1.13. Decarbonizaci of maritime transport												
	1.7.							1	1											
	1.8.		1	1	1			1	1											1
	1.9.					1		1	1											1
	1.10.							1		1			1							1
	1.11.		1					1		1										1
	1.12.	1				1	1	1		1										1
	1.13.					1	1	1		1			1							1

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy de Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
1.14.	Decarbonización of air transport						1	1		1								1	1	
1.15.	Development of biogas and biomethane			1			1	1											1	1
1.16.	Development of renewable hydrogen	1					1	1		1										1
1.17.	Plan for the repowering and reengineering of existing renewable electricity generation projects							1	1											1
1.18.	Strategic autonomy and value chain							1		1				1						1
1.19.	New business models for the energy transition			1			1	1	1		1									

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the environment and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployable integration of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		1.20.	1.21.	1.22.	1.23.	1.24.	1.25.													
	Promotion of bilateral procurement and promotion of forward markets for renewable electricity							1												
	Specific programmes for using biomass			1				1												1
	Unique projects and strategy for sustainable energy on islands							1												1
	Energy Communities							1	1			1								1
	Citizenship at school		1	1				1				1			1					1
	Strategy for Just transition								1			1								



Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment and integration of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovabl and its sectoral integration	10. Strategie a de Transición n Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		1.26.	1.27.	1.28.	1.29.	1.30.	1.31.	1.32.												
	Public procurement of renewable energy							1												
	Training of professionals in the renewable energy sector							1			1							1		1
	Review and simplification of administrative procedures							1		1		1								1
	Knowledge generation, dissemination and awareness							1									1			1
	European Emissions Trading System																			
	Building life cycle analysis		1																	
	Reduction of GHG emissions in the agricultural and livestock sectors				1															

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		1.33. Reduction of GHG emissions in waste management	1.34. Reduction of GHG emissions related to fluorinated gases	1.35. Forest sinks	1.36. Agricultural sinks	1.37. Taxation	2.1. Low emission zones and modal shift measures	2.2. Modal shift in freight transport with a higher presence of rail												
				1																
					1															
				1																
Energetic efficiency	2.1.		1					1												
	2.2			1																

Synergies between the LAP III components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the port and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU
		2.3	2.4	2.5	2.6	2.7													
2.3	Renewal of the rolling stock of transport and efficiency in management	1					1												
2.4	Improving the efficiency and sustainability of ports						1												
2.5	Promotion of electric vehicles	1	1				1		1									1	1
2.6	Improvements in technology and process management systems in non-energy intensive industries												1				1		
2.7	Improvements in technology and process management systems in energy intensive industries																		

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovabl and its sectoral integration	10. Strategic de Transición n Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU
		2.8. Energy efficiency in existing buildings in the residential sector	2.9. Renewal of residential equipment	2.10. Heat and district cold networks	2.11. Energy efficiency in buildings in the tertiary sector.	2.12. Heat and district cold networks in the tertiary sector	2.13. Energy efficiency in cold generating equipment and large air-conditioning installations sector tertiary e public infrastructure												
			1																
			1																
			1				1												
			1									1		1	1				
			1																
			1					1											

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy de Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
2.14.	Energy efficiency on farms, irrigation communities and agricultural machinery			1																
2.15.	Energy efficiency in the fisheries sector			1																
2.16.	Promotion of energy performance contracting		1						1											
2.17.	Public sector: accountability and energy efficient public procurement		1									1								
2.18.	Energy audits and energy management systems												1							
2.19.	Training of professionals in the energy efficiency sector		1								1							1		

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovabl and its sectoral integration	10. Strategie a de Transición n Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU
		2.20. Communication and information on energy efficiency	2.21. Other measures to promote energy efficiency: transition in high-efficiency cogeneration	2.22. Financial measures: National Energy Efficiency Fund	2.23. System of Certificates of Saving Energy	3.1. Plan + Energy Security	3.2. Maintenance of minimum safety stocks of petroleum products and gas												
			1																
													1						
			1								1								
			1										1						
Energy security																			

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the tourism and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU		
3.3.	Reducing energy dependency on islands							1	1											1	
3.4.	Recharging points for alternative fuels	1					1			1										1	1
3.5.	Boosting regional cooperation							1	1												
3.6.	Further development in contingency																				
3.7.	Planning for the safe operation of a decarbonised energy system							1	1												
3.8.	Strategic raw materials for the energy transition							1	1								1				
3.9.	Cybersecurity in the Energy Sector															1					

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment and integration of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU		
		4.1. New electricity market design	4.2. Fight against energy poverty	4.3. Marketplace Capacity	4.4. Increase of electricity interconnection in the internal market	4.5. Energy Transport Network Development Plan Electric 20212026	4.6. Integration of the electricity market	4.7. Protecting electricity consumers and increasing competition													
Internal energy market	4.1.	New electricity market design						1	1											1	
	4.2.	Fight against energy poverty																			
	4.3.	Marketplace Capacity						1	1												
	4.4.	Increase of electricity interconnection in the internal market						1	1												
	4.5.	Energy Transport Network Development Plan Electric 20212026						1	1												
	4.6.	Integration of the electricity market							1	1											
	4.7.	Protecting electricity consumers and increasing competition								1											



Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the aquaculture and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment and integration of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategic Plan for the Green Transition	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU	
		4.8. Access to data	4.9. Gas market integration	4.10. Protection of gas consumers	4.11. Improving the competitiveness of the retail gas sector	4.12. Iberian Hydrogen Corridor. H2MED	4.13. Local electricity markets	5.1. Strategic action in climate, energy and mobility	5.2. Implementation of the SET-Plan	5.3. Complementary plans in the										
									1						1					
										1										1
																				1
Research, innovation and																				

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the tourism and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU
		energy and climate sectors																	
5.4.	Scientific and technical infrastructure in the energy and climate sectors							1		1						1			
5.5.	Public Procurement of Innovative Technology (CPTI) and Commercial															1			
5.6.	Strengthening public venture capital for energy and climate technology transfer															1			
5.7.	Regulatory changes to facilitate research and innovation															1			
5.8.	Promoting public-private partnerships															1			

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitanos	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiverse	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovabl and its sectoral integration	10. Strategi a de Transición n Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU		
		5.9.	5.10.	5.11.	5.12.	5.13.															
	Shared renewable energy research centres																				
	Promote an innovation hub on renewable energy, storage and/or hydrogen at the City of Energy Foundation, CIUDEN										1	1									
	Improve governance and coordination of SECTI																				
	Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition			1		1		1	1	1				1	1	1					
	Technology platforms and ALINNE alliance								1	1	1										

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renewable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU		
		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 Innovation 2.0	5.17. European Energy and Climate Innovation Funding Facilities	5.18. Regulatory testing bank in the electricity sector	6.1. Gender perspective	6.2. Mainstreaming climate change adaptation objectives													
								1	1	1											
								1	1	1											
								1	1	1											
								1	1												
Cross-cutting issues	6.1.	Gender perspective	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1
	6.2.	Mainstreaming climate change adaptation objectives	1	1	1	1	1	1	1	1				1							

Synergies between the leverage policy components of the PRTR and the measures of the NECP		1. Shock plan to mobilise sustainable, safe and connected mobility in urban environments and Metropolitan Areas	2. Renovation plan for housing and urban regeneration	3. Environmental and digital transformation of the entourage and fisheries agroalim system	4. Preservation and restoration of ecosystems and its biodiversity	5. Coastal Preservation and water resources	6. Mobilising sustainable, secure and connected to	7. Deployment of renewable energy is	8. Electrical infrastructure promoted of integrated networks and deployments of relaxation and storage	9. Roadmap for hydrogen and/or renovable and its sectoral integration	10. Strategy of the Transición Just	11. Modernisation of the Government Administration	12. Policy Industrial Spain 2030	14. Plan for the modernisation and competitiveness of the tourism sector	15. Digital Connectivity, Fostering Cyber Security and Deployment of 5G	17. Institutional reform and strengthening of the capacities of the national science and innovation system	23. New public policies for a dynamic, resilient and inclusive labour market	28. Adapting the taxation system to the reality of the 21st century	31. Chapter RePower EU
		6.3.	6.4	6.5	6.6	6.7													
The Recovery and Resilience Facility	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fund of Just transition				1			1			1	1								
Social Climate Fund	1	1					1												
Policy Common Agricultural				1	1	1													
Cohesion Policy								1	1		1								

## The Just Transition Fund

### Measure 6.4 Just Transition Fund

#### a) Description

The Just Transition Fund is a novel instrument of the European Cohesion Policy, since for the first time it focuses its actions on specific challenges, those arising from the just transition, and on specific territories, at provincial or lower level.

In this context, the European Commission approved on 20/12/2022 the Territorial Just Transition Plan<sup>142</sup> and the Just Transition Programme of Spain 2021-2027<sup>143</sup>. 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, representing some EUR 1.250 million in total expenditure to be certified in the territories most affected by the energy transition.

Support from this fund is expected to contribute to the creation of 6.000 jobs in these territories and to support more than 1.900 enterprises, mostly SMEs.

The definition of the content of the Just Transition Fund through each Territorial Plan and Programme is based on the work started by Spain in 2018 in 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 on climate change and energy transition;
- the integrated National Energy and Climate Plan (NECP); and
- the Just Transition Strategy (JTS).

In the 2019 PNIEC target scenario, all coal-fired electricity generation was expected to cease by 2030. However, the latest economic, technical and regulatory developments have led to all coal-fired power stations in the country having now completed their closure, are in the process of being closed down or are subject to medium-term closure plans, so it is estimated that coal could be fully shut down 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).

#### b) Objectives addressed

The objectives addressed by the Just Transition Fund in Spain are based on the needs identified in the affected areas, proposing to expand, improve and supplement what has been initiated, based on previous work carried out in the country, with the following objectives:

1. The JTF helps to complement the work started to deliver on the Just Transition Strategy's objective that closures should have a zero impact on jobs and population in the medium term. To this end, it is proposed to support projects that have already been emerging in the affected areas and, in particular, to strengthen the dynamic work being carried out to identify and accompany new projects in areas where it is more difficult to attract investment.

The JTF will help boost the decarbonisation and industrial renovation process in areas where companies with high industrial emissions are located in these territories because they are close to traditional energy resources (coal). The JTF interventions are structured around the following axes:

- a. Green transformation of industry and promotion of sustainable mobility, circular economy and energy efficiency.
- b. Boosting the renewable energy value chain, self-consumption, energy storage and renewable hydrogen.
- c. Encouraging SMEs and business projects for the economic diversification of the regions.
- d. Promotion of research, development and innovation (R & D & I), integration of ICT and digital transformation.
- e. Environmental rehabilitation, nature conservation, biodiversity and ecosystems, promotion of

<sup>142</sup>[https://www.transicionjusta.gob.es/Documents/Union\\_Europea/Fondo\\_Transicion\\_Justa/common/PLAN%20FTJ\\_ESP\\_2021-2027.pdf](https://www.transicionjusta.gob.es/Documents/Union_Europea/Fondo_Transicion_Justa/common/PLAN%20FTJ_ESP_2021-2027.pdf)

<sup>143</sup>[https://www.transicionjusta.gob.es/Documents/Union\\_Europea/Fondo\\_Transicion\\_Justa/common/PROGRAMA%20FTJ\\_ESP\\_2021-2027.pdf](https://www.transicionjusta.gob.es/Documents/Union_Europea/Fondo_Transicion_Justa/common/PROGRAMA%20FTJ_ESP_2021-2027.pdf)

historical heritage related to mining, and promotion of sustainable tourism.

- f. Promoting social infrastructure, the social economy and training and qualification initiatives

**c) Mechanisms for action**

The 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 the creation of financial instruments is also envisaged.

**d) Relationship and synergistic effect with the NECP**

The main relationship between the JTF and the NECP relates to Measure 1.21 of the Just Transition Strategy, which aims to anticipate and manage in a fair and solidarity-based manner the consequences for those districts and people directly linked to technologies that will be progressively displaced as a result of the transition promoted by the Plan.

The JTF will also complement, through the support projects developed with this fund, 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 in non-energy intensive industries
- Measure 2.7. Improvements in technology and process management systems in 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 is necessary to stress that Regulation (EU) 2021/1060 of 24 June 2021 laying down common provisions for 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 and a climate-neutral economy of the Union 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 for climate change objectives is set at 100 %** for all areas of intervention used.

This takes into account that just transition is a necessary condition for the climate transition, and its actions contribute 100 % to it.

**e) Bodies responsible**

The JTF Management Authority (Subdirectorato-General for ERDF Management of the Directorate-General for European Funds of the Ministry of Finance and the Civil Service) has delegated part of its tasks to the Intermediate Bodies, which will be, in addition to the Just Transition Institute,

the bodies that designate the Autonomous Communities with 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 according to the same criteria used by the JTF Regulation to distribute the allocations between the Member States according to the following table:

<b>Territory</b>	<b>JTF support</b>	<b>%</b>
Palencia	71.558.029	8.24 %
Leon	125.517.602	14.45 %
<b>Castilla and León</b>	<b>197.075.631</b>	<b>22.69 %</b>
Cadiz	69.631.757	8.02 %
Cordoba	32.160.979	3.70 %
Almería	51.817.002	5.96 %
<b>Andalusia</b>	<b>153.609.739</b>	<b>17.68 %</b>
Asturias	262.850.921	30.26 %
<b>Asturias</b>	<b>262.850.921</b>	<b>30.26 %</b>
Teruel	91.703.862	10.56 %
<b>Aragon</b>	<b>91.703.862</b>	<b>10.56 %</b>
To Coruña	111.380.018	12.82 %
<b>Galicia</b>	<b>111.380.018</b>	<b>12.82 %</b>
<b>Area TJ Alcudia</b>	<b>17.374.897</b>	<b>2.00 %</b>
<b>ITJ</b>	<b>34.749.795</b>	<b>4.00 %</b>
<b>TOTAL JTF</b>	<b>868.744.863</b>	<b>100.00 %</b>

In addition, the audit authority for the programme will be the responsibility of the Intervención General de la Administración del Estado (IGAE), the Ministry of Finance and the Civil Service. The body receiving payments from the Commission will be the Subdirectorato-General for Economic and Financial Affairs of the European Union of the Secretariat for the Treasury and International Financing of the Ministry of Economic Affairs and Digital Transformation. The accounting function will be carried out by the Subdirectorato for Certification and Payments of the DG for European Funds, which is also part of the Ministry of Finance and the Civil Service.



## Social Climate Fund

### Measure 6.5 Social Climate Fund

#### a) Description

The increased climate ambition at European level set out in the Fit for 55 package means increasing the contribution of all sectors to the mitigation of GHG emissions. The Fit for 55 package therefore amends the Emissions Trading System (ETS), extending this scheme to fossil fuels consumed in the buildings sector, the road transport sector and other additional 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,<sup>144</sup> this new system will become operational by 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 households, micro-enterprises and vulnerable transport users, who spend a larger part of their income on energy and transport and, in certain regions, do not have access to alternative and affordable mobility solutions. To address these impacts, the establishment of the Social Climate Fund (SCF) has also been agreed through Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/106.<sup>145</sup> The SCF, which is scheduled to run for the period 2026-2032, will be financed with part of the revenue from the new ETS 2. 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 (PSPC) setting out the measures and investments to cushion the social and distributional impacts of ETS 2 on the most vulnerable. The PSPC may include, inter alia, 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 shall be financed from the EU budget. In addition, each Member State should also contribute at national level to the PCP budget, from its own budget up to a co-financing value of 25 %. As mentioned above, the Social Climate Plan will be able to 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 ETS 2 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 according to Regulation 2023/955 must be included in the PSPC.

#### b) Objectives addressed

The Social Climate Fund aims to mitigate the impact caused by the increase in the price of fossil fuels caused by the extension of the ETS to fuels used in the building, road transport and other sectors on vulnerable households, micro-enterprises and vulnerable transport users who do not have access to alternative and affordable mobility solutions. The SCF thus contributes to addressing the social and distributional challenges of the EU's green transition.

#### c) Mechanisms for action

- Drawing up the Social Climate Plan in line with meeting the European and Spanish climate and energy targets. The measures included in the Plan will 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 the 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 they have a redistributive effect and mitigate the negative effects of the extension of the ETS.
- In the design of the PSPC, particular attention will be paid to the effects on the rural environment, so that the measures of the NECP can generate benefits in the territory. Furthermore, it is particularly important to implement measures that promote and improve

<sup>144</sup> <https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=CELEX%3A32023L0959>

<sup>145</sup> [https://eur-lex.europa.eu/legal-content/ES/TXT/HTML/?uri=CELEX:32023R0955&qid=1686514537771#ntc37-L\\_2023130ES.01000101-E0038](https://eur-lex.europa.eu/legal-content/ES/TXT/HTML/?uri=CELEX:32023R0955&qid=1686514537771#ntc37-L_2023130ES.01000101-E0038)

connectivity in rural areas.

#### **d) Relationship and synergistic effect with the NECP**

The NECP, as a general framework for the energy transition in Spain, includes all the type of actions that could be included in Spain's future Social Climate Plan: energy efficiency, renovation of buildings, decarbonisation of heating and cooling systems in buildings and promotion of zero- and low-emission mobility. Below are some measures of this Plan that could be transferred, with the appropriate amendments, to the Social Climate Plan:

- Building sector
  - r Measure 1.8. Development of self-consumption with renewables and distributed generation
  - r Measure 2.8. Energy efficiency in existing buildings in the residential sector
  - r Measure 2.9. Renewal of residential equipment
- For the road sector:
  - r Measure 2.1. Low emission zones and modal shift measures
  - r Measure 2.2. Modal shift in freight transport with a higher presence of rail
  - r Measure 2.3. Renewal of the rolling stock of means of transport and efficiency in management
  - r Measure 2.5. Promotion of electric vehicles

Moreover, Measure 4.2 deserves specific mention. Combating energy poverty and its implementation through the National Energy Poverty Strategy 2019-2024. Interventions in energy-poor households have higher aid intensities.

#### **e) Bodies responsible**

General Administration of the State and Autonomous Communities and the appropriate authority.

## Common agricultural policy

### Measure 6.6 Common Agricultural Policy

#### a) Description

On 31 August 2022, the European Commission approved Spain's CAP Strategic Plan (CAP), as 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, which implies greater coherence between them. In addition, this reform has given more flexibility to adapt CAP measures to Member States' national and regional specificities.

This Plan is therefore a unique opportunity to address the needs of the Spanish agricultural sector and rural environment as a whole, even beyond the CAP instruments itself, through all the interventions.

#### b) Objectives addressed

The CAP Strategic Plan 2023-2027 aims at the sustainable development of agriculture, food and 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 and food supply capacity) and threaten the environmental sustainability of both the sector and the country. The EPAP aims to respond to them by responding to the identified needs.

In relation to environmental and climate challenges, the EPAP shall address the environmental needs 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
- Promoting 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 to the European Green Deal and its Farm to Fork and Biodiversity Strategies for the 2030 horizon, and also to the 'Fit for 55' legislative package.

This increased environmental and climate ambition is supported by the budget as Spain estimates that approximately 43 % of the total EPAP budget will contribute to environmental and climate objectives. Building on the baseline of enhanced cross-compliance, the EPAP wishes to incentivise productive changes through additional voluntary payments at national level (eco-schemes) and regional design (mainly aid for environmental and climate commitments, but also other measures under the EAFRD).

#### c) Mechanisms for action

The EPAP provides for the following specific mechanisms that 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 voluntarily undertake management commitments.
- Investment aid under additional conditions and specifications laid down in the CAP Strategic Plan.
- Aid for cooperation under additional conditions and specifications laid down in the CAP Strategic Plan.

#### d) Relationship and synergistic effect with the NECP

The Common Agricultural Policy interventions that contribute to achieving the objectives of the NECP concerning the reduction of GHG emissions in the agricultural and livestock sectors and the enhancement of agricultural sinks are as follows:

- Eco-regímen Carbon Agriculture and Agroecology: Rotations and direct sowing on non-irrigated arable land.
- Eco-regímen Carbon Agriculture and Agroecology: Rotations and direct sowing on dry wet arable land.
- Eco-regímen Carbon Agriculture and Agroecology: Rotations and direct sowing on irrigated arable land.
- Eco-regímen Carbon Agriculture: Green cover and inert cover on woody crops on steep sloping land.
- Eco-regímen Carbon Agriculture: Green cover and inert cover on woody crops on medium slope land.
- Eco-regímen Carbon Agriculture: Plant cover and inert cover on woody crops on flat land.
- Eco-regímen Carbon Agriculture and Agroecology: Extensive grazing, mowing and biodiversity on wet pastures.
- Eco-regímen Carbon Agriculture and Agroecology: Extensive grazing, mowing and biodiversity on areas of Mediterranean pastures.
- Agri-environmental commitments on agricultural areas. Commitments to promote and sustainably manage pastures.
- Agri-environmental commitments on agricultural areas. Soil improvement and anti-erosion practices.
- 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 in agricultural holdings linked to mitigation – climate change adaptation, efficient use of natural resources and biodiversity.
- Forest investments No productive afforestation and agroforestry systems.
- Forest investments No productive in restoration of forest damage.
- Forest investments No productive in forestry activities with environmental objectives.

Common Agricultural Policy interventions that also contribute to achieving the objective of the NECP on improving energy efficiency on farms, irrigation communities and agricultural machinery and promoting renewable energy:

- Support for productive investments in agricultural holdings linked to contributing to climate change mitigation and 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 in order to increase energy self-sufficiency and for the adoption 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 improving infrastructure

#### e) Bodies responsible

General State Administration and Autonomous Communities.

## Cohesion Policy

### Measure 6.7 Cohesion policy

#### a) Description

With a total allocation of EUR 35.562 billion, Spain is the third largest beneficiary of EU cohesion policy funds in the 2021-2027 period, after only Poland and Italy. This allocation is divided into 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 strengthen and consolidate, from a territorial cohesion perspective, the strong programme of structural reforms and transformative investments of the PRTR.

The Spanish Association Agreement (AA) for the 2021-2027 programming period constitutes a broad and flexible framework agreement that provides coverage for all the 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, together with the partnership process, has made it possible to arrive at a diagnosis of investment needs 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 – known as policy objectives (POPs) in the cohesion policy regulatory framework.

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 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 strategic orientations set out by the European Green Deal, and with subsequent developments in both the Fit for 55 package and the REPowerEU Plan, and the Commission Communication “Renovation Wave for Europe”. Investments in energy transition are shaped around three specific objectives: promoting energy efficiency; the promotion of renewable energies; and the development of smart energy storage systems, grids and equipment.

#### c) Mechanisms for action

Energy transition resources are generally articulated and channelled either through direct implementation actions by administrations or in the form of support for private investment. In some cases, work is ongoing on the design of financial instruments to provide support, either by taking equity participations in innovative projects or companies, or by means of loans or guarantees.

#### d) Relationship and synergistic effect with the NECP

**Energy efficiency** is the first focus of action to make progress on decarbonising 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 measures for buildings, both residential and non-residential, and both public and private.

On the government side, investments will be made to improve energy efficiency and the use of renewable energy sources in buildings and public infrastructure using energy, taking into account the important demonstration effect of these actions. In addition, measures are planned to support the energy renovation of the private housing stock – which may complement interventions from other funds focused on combating energy poverty – and to support energy efficiency in enterprises – primarily SMEs – as well as support for the development of advisory networks or energy services.

In all programmes, priority will be given to those interventions that involve deep renovations, and to focus actions on buildings and infrastructure with the greatest energy saving potential, with a view, as far as possible, to ensuring a minimum level of significant energy savings from renovations. In addition, priority will be given to interventions that may be integrated in 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 aim to focus support on projects for the development and deployment of non-traditional and innovative renewables, whose cost-effectiveness is far from that of more mature technologies, such as renewable gases. This includes support for biogas production, support for green hydrogen or support for biomass projects.

In any case, as a result of the urgency of accelerating the deployment of renewable energy production, provision is also made for the possibility of forms of support for the large-scale deployment of more widely deployed renewables.

On the other hand, projects are planned to facilitate citizens' participation in the energy transition, including those aimed at promoting self-consumption in the various areas of the economy, providing support for 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 aimed at promoting the full uptake of renewable energies in different sectors. In relation to the building sector, measures are planned to incorporate renewable thermal heating and cooling for both residential and non-residential and public and private sectors. On the other hand, projects aimed at promoting the decarbonisation of the transport sector through the proper integration of renewable energy into the transport sector are envisaged.

Finally, it is also envisaged that cohesion policy instruments could finance actions relating to the 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. the integration of renewable energies, the progressive electrification of energy end uses) and better monitoring, control and, ultimately, manageability. In addition, the possibility of supporting the development of new business models contributing to demand management, storage associated services or new technologies deployed in the sector is envisaged.

#### e) **Bodies responsible**

In the case of multi-regional programmes, the programme authorities are located in the General State Administration, while in the case of regional programmes they are located in the Autonomous Communities.

### **3.6.5. Interlinkages between policies and measures**

Throughout this section, the different policies and measures have been presented as corresponding to the category of implementation 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 interlinked with the dimensions of decarbonisation, energy efficiency, security of supply, internal market and research, innovation and competitiveness.

In the matrix of interlinkages between policies and measures presented in this section, it can be seen that the research, innovation and competitiveness dimension is cross-cutting to the other dimensions, since any improvement in these aspects will lead to the achievement of the objectives set.

**Table 3.6. Matrix of interrelations between policies and measures**

	Decarbonisation					Energy efficiency					Energy security			Internal Energy market			R & I		
	GHG emissions		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	XP	RES-T	RES-H 'c														
1.1. Development of renewable energy compatible with biodiversity and ecosystem protection																			
1.2. Development of renewable energies compatible with the territory, biodiversity, life and rural development.			1								1	1	1	1			1		
1.3. Development of new electricity-generating installations using renewable energy	1		1																
1.4. Development of innovative renewable energy installations			1																
1.5. Energy storage																			
1.6. Demand management and flexibility																			
1.7. Adaptation of electricity grids for the integration of renewables																			



	Decarbonisation					Energy efficiency				Energy security			Internal Energy market				R & I + c		
	GHG emissions		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	%	RES-T	RES-H&C														
1.8. Development of self-consumption with renewables and distributed generation																			
1.9. Development of new hydroelectric energy storage capacity										1	1	1							
1.10. Decarbonisation of the Industrial Sector																			
1.11. Framework for the development of thermal renewables																			
1.12. Advanced biofuels in transport		1	1	1															
1.13. Decarbonisation of the maritime transport		1	1	1															
1.14. Decarbonisation of air transport		1	1	1															
1.15. Development of biogas and biomethane																			

	Descarbonización					Eficiencia energética				Seguridad energética			Mercado Interior de la Energía				I+i+c		
	Emisiones GEI		Energías renovables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	%	RES-T	RES-H&C														
1.16	Desarrollo del hidrógeno renovable																		
1.17	Plan de renovación tecnológica en proyectos ya existentes de generación eléctrica con energías renovables																		
1.18	Refuerzo de la cadena de valor del desarrollo de tecnologías para la descarbonización																		
1.19	Promoción de la contratación bilateral y del fomento de los mercados a plazo de energía eléctrica renovable																		
1.20	Programas específicos para el aprovechamiento de la biomasa																		
1.21	Proyectos singulares y estrategia para la energía sostenible en las islas																		
1.22	Comunidades de energías renovables																		
1.23	La ciudadanía en el Centro																		

	Decarbonisation					Energy efficiency				Energy security			Internal Market for energy				R & I + c		
	GHG emissions		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	XP	RES-T	RES-H 'c														
1.24. Fair transition strategy																			
1.25. New business models for the energy transition																			
1.26. Public procurement of renewable energy																			
1.27. Training of professionals in the renewable energy sector	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1		
1.28. Review and simplification of administrative procedures	1	1	1	1	1						1	1	1	1		1			
1.29. Knowledge generation, dissemination and awareness raising	1	1	1	1	1	1	1	1	1	1	1	1							
1.30. European Emissions Trading System											1	1	1						
1.31. Building life cycle analysis																			

Efficiency energy		Decarbonisation						Energy efficiency				Energy security			Internal Energy market				R & I		
		GHG emissions		Renewables				Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
		ETS	No-ETS	%	RES-T	RES-H&C	RES-E														
	Reduction of GHG emissions in the agricultural sectors and .. livestock breeder:																				
	1.33. Reduction of GHG emissions in waste management																				
	1.34. Reduction of GHG emissions related to fluorinated gases																				
	1.35. Forest sinks																				
	1.36. Agricultural sinks																				
	1.37. Taxation																				
	2.1. <sup>7 DH. .. HI</sup> Low emission zones and modal shift measures																				
	2.2. Modal shift in freight transport with a higher presence of rail																				

Renewal of the rolling stock of means of transport and efficiency in management

Improving the efficiency and sustainability of ports

Promotion of electric vehicles

Improvements in technology and process management systems in non-energy intensive industries

Improvements in technology and process management systems in energy intensive industries

2.3. Energy efficiency in existing buildings in the residential sector

2.4. Renewal of residential equipment

2.5. Calor and District Frío Networks

2.6.

2.7.

2.8.

2.9.

		Decarbonisation					Energy efficiency				Energy security			Internal Energy market			R & I				
		Emissions GHG		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c	
ETS	No-ETS	%	RES-T	RES-H&C	RES-E																
		1	1	1																	
											1	1	1								
									1					1				1	1	1	

	Decarbonisation					Energy efficiency				Energy security			Internal Energy market				R & I + c		
	Emissions GHG		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	%	RES-T	RES-H&C														
2.11. Energy efficiency in buildings in the tertiary sector.		■	■		■					■	■								
2.12. Heat and district cold 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					1	1	1										1	1	
2.14. Energy efficiency on farms, irrigation communities and agricultural machinery		■	■														■		
2.15. Energy efficiency in the fisheries sector		■								■									
2.16. Promotion of energy performance contracting																		■	
2.17. Public sector: accountability and energy efficient public procurement						■													
2.18. Energy audits and energy management systems																			

	Decarbonisation					Energy efficiency					Energy security		Internal Market for energy					R & I + c	
	GHG emissions		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	XP	RES-T	RES-H 'c														
2.19. Training of professionals in the energy efficiency sector						1	1	1	1	1									
2.20. Communication and information on energy efficiency						1	1	1	1	1									
2.21. Other measures to promote energy efficiency: transition in high-efficiency cogeneration							1			1	1	1							
2.22. Financial measures: National Energy Efficiency Fund						1	1	1	1	1									
2.23. Energy Saving Certificates Scheme						1	1	1	1	1									
3.1. Plan + Energy Security											1	1	1		1	1	1	1	
3.2. Maintenance of minimum safety stocks of petroleum products and gas													1					1	
3.3. Reducing dependence on oil and coal on islands	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Energy security

	Decarbonisation					Energy efficiency				Energy security			Internal Energy market			R & I + c			
	Emissions GHG		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	%	RES-T	RES-H&C														
3.4. Recharging points for alternative fuels	1	1	1								1	1	1						
3.5. Boosting regional cooperation			1			1	1	1	1	1	1	1		1	1	1			
3.6. Deepening contingency plans											1	1	1	1	1	1	1		
3.7. Planning for the safe operation of a decarbonised energy system			1			1	1	1	1	1	1	1	1	1	1	1			1
3.8. Strategic raw materials for the energy transition																			
3.9. Cybersecurity in the Energy Sector													1			1	1	1	
4.1. New electricity market design						1										1	1	1	
4.2. Fight against energy poverty																1	1	1	



- Capacity Markets
- Increase of electricity interconnection in the internal market.
- Electricity Transmission Network Development Plan 2021-2026
- Integration of the electricity market
- Protecting electricity consumers and increasing competition
- 4.3. Access to data
- 4.4. Gas market integration
- 4.5. Protection of gas consumers
- 4.6.
- 4.7.
- 4.8.
- 4.9.

	Decarbonisation			Energy efficiency			Energy security			Internal Energy market				R & I	
				Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
4.3. Access to data							1	1	1		1	1	1		
4.4. Gas market integration	█	█	█	█	█	█									
4.5. Protection of gas consumers				█							█	█			
4.6.	█	█	█	█	█	█				█		█	█	█	
4.7.						█				█			█	█	
4.8.	█	█	█	█	█	█						█			
4.9.	█	█	█	█	█	█			█		█	█	█		

Research, Innovation and Competitiveness

	Decarbonisation					Energy efficiency					Energy security			Internal Energy market				R & I + c	
	GHG emissions		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	XP	RES-T	RES-H 'c														
4.11																			
4.12.																			
4.13																			
5.1.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5.2.	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1			
5.3.			1	1	1	1													
5.4.			1	1	1	1	1	1	1	1									
5.5.																			

	Decarbonisation					Energy efficiency				Energy security			Internal Energy market				R & I + c		
	Emissions GHG		Renewables			Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c
	ETS	No-ETS	%	RES-T	RES-H&C														
5.6. Strengthening public venture capital for energy and climate technology transfer																			
5.7. Regulatory changes to facilitate research and innovation																			
5.8. Promoting public-private partnerships																			
5.9. Shared renewable energy research centres			1	1	1	1													
5.10. Relaunching the City of Energy Foundation, CIUDEN	1	1	1	1	1	1	1	1	1	1	1	1							
5.11. Improve governance and coordination of SECTI	1	1	1	1	1	11	1	1	1	1	1	1							
5.12. Strategic Projects for Economic Recovery and Transformation (PERTE) in energy transition			1	1	1	1	1	1	1	1									
5.13. Technology platforms and ALINNE alliance																			

Cross-cutting aspects in the Ecological Transition	Decarbonisation						Energy efficiency					Energy security			Internal Energy market				R & I + c		
	GHG emissions		Renewables				Servicios y sector público	Industria	Transporte	Residencial	Agricultura	Reducción dep. energ.	Reducción importaciones	Seguridad de suministro	Simplificación administrativa	Interconexiones	Redes transp. y distrib.	Coste energía	Pobreza energética	I+i+c	
	ETS	No-ETS	XP	RES-T	RES-H 'c	RES-E															
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 Innovation 2.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5.17. European Energy and Climate Innovation Funding Facilities	1	1	1	1	1	1	1	1	1	1	1	1	1								
5.18. Regulatory testing bank in the electricity sector																					
6.1. Gender perspective	1	1	1	1			1	1	1	1	1	1	1								
6.2. Mainstreaming climate change adaptation objectives	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6.3. The Recovery and Resilience Facility																					



## 4. ANALYSIS OF THE IMPACT OF POLICIES AND MEASURES

### 4.1. POLICIES AND MEASURES

According to recent studies by major international bodies (OECD 2017, IRENA 2018, IEA 2023) the energy transition will lead to net increases in welfare levels, economic activity and employment, as well as multiple co-benefits in public health (Markandya et al 2018). These benefits are particularly important in those countries most dependent on fossil fuels and with a high availability of renewable resources.

For example, the OECD study *Investing in Climate, Investing in Growth*, points out that complying with the Paris Agreement would generate immediate positive impacts and increase long-term growth potential by up to 2.8 % on average in the G20 countries. Other studies such as IRENA's *Global Energy Transformation* agrees with the OECD on the positive impacts and points out that within the most beneficial G20 countries those located in southern Europe will be.

Finally, and more recently, the International Energy Agency foresees in its report *Technology Energy Perspectives 2023* that if the announced energy and climate commitments are met, net jobs associated with the new "clean" industries would rise from the current 6 billion to almost 14 billion by 2030 globally. IEA notes that the transition will have opportunities and risks such as security of supply, access to critical materials, as well as effects on competitiveness in global value chains.

This chapter analyses the socio-economic and public health impact of the NIEPC<sup>146</sup>. Firstly, the methodology used and the estimation of the investments needed to achieve the objectives are presented. The main macroeconomic impacts (GDP and employment) and the impact on public sector and household accounts are then presented. Finally, a sensitivity analysis, limitations of the methodology used and final conclusions are presented.

### 4.2. METHODOLOGY

The economic impacts were estimated using the DENIO model. DENIO is a Neokeynesian Econometric Dynamic Model Input-Output (Kratena et al. (2013) of the Spanish economy comprising 74 sectors, 88 products, 16 categories of consumption, 22.000 types of households and the public sector. DENIO is a model designed to assess the economic impact of scenarios and policies in Spain, in particular those related to energy and climate change. The model analyses the impact of these policies on a range 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.

The co-benefits for health were estimated using the TM5-FASST model. TM5-FASST (Van Dingenen et al. (2018) is an air quality future-receptor model that makes it possible to analyse the health effects of different emission paths. 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<sup>147</sup> (Burnett et al. 2014, Markandya et al 2018). A more detailed description of both models can be found in the annexes.

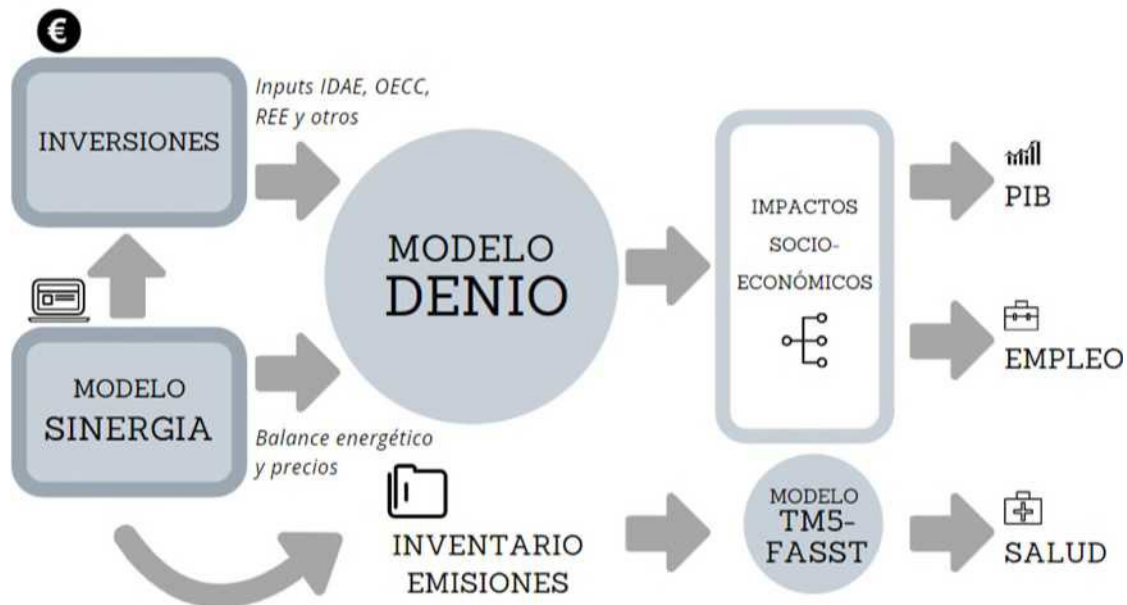
---

<sup>146</sup>This chapter is an updated version of the impacts of the previous version of the NECP (2019)

<sup>147</sup>IHME: Institute for Health Metrics and Evaluation

Figure 4.1 gives an outline of the process followed. On the one hand, and on the economic side, input information has been introduced in DENIO (a) the energy balances and energy prices obtained from the TIMES-SINERGIA model and (b) the estimated investments to achieve the objectives. The impact study is carried out on the basis of an economic reference scenario as at 2030 prepared 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

On the other hand, on the health side, the Inventory Unit of the Ministry for Ecological Transition and the Demographic Challenge (MITECO) used the energy balance data of the TIMES-SINERGIA model to estimate the evolution of emissions of air pollutants at 2030. This information is included in the TM5-FASST model to estimate the co-health benefits.

### 4.3. INVESTMENTS

This section sets out the estimated total investments for the period 2021-2030 necessary to achieve the objectives of the NECP.

Investments can be divided into the following five broad categories: (I) energy saving and efficiency; (II) electrification of the economy; (III) grids (iv) renewable energy (including green hydrogen) and (v) othermeasures<sup>148</sup>.

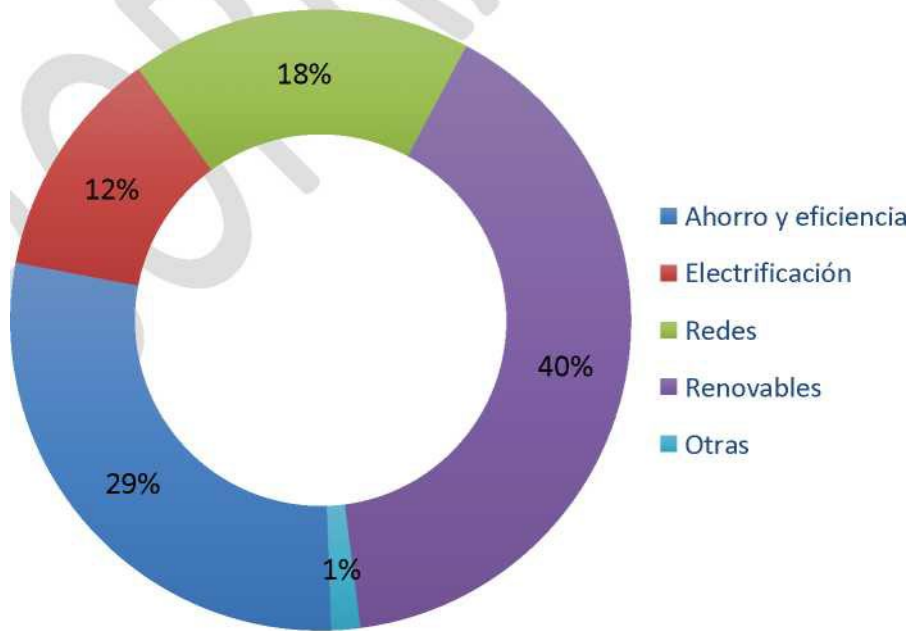
The information on the basis of which investments are estimated comes from a number of sources. The investments dedicated to increasing energy saving and efficiency come from the Institute for Energy Diversification and Saving (Instituto para la Diversificación y Ahorro de la Energía, IDAE). The investments associated with renewable energy (electric and thermal) and in electrification come from the TIMES-SINERGIA model. The basic information on investments in transmission and distribution networks is provided by Red Eléctrica de España. Finally, the information on investment in the non-ETS sectors not related to energy comes from the Spanish Climate Change Office (Oficina Española de Cambio Climático, OECC).

<sup>148</sup>This category includes measures and investments associated with diffuse non-energy sectors. They are included separately, even though they are small because of their difficulty in being included in any other category.

It is estimated that total investments<sup>149</sup> to achieve the objectives of the NECP will reach EUR 294.000 billion (MEUR) between 2021-2030. These investments (see 4.2) are split between renewables (40 %), energy saving and efficiency (29 %), networks (18 %) and electrification (12 %) 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 (85 % of the total) and the rest from the public sector (15 % of the total). It is noteworthy<sup>150</sup> that thanks to Next Generation EU funds and the PRTR a significant share of public investments are financed by European funds (11 % of the total).

**Figure 4.2. Breakdown of total investments by type of measures**

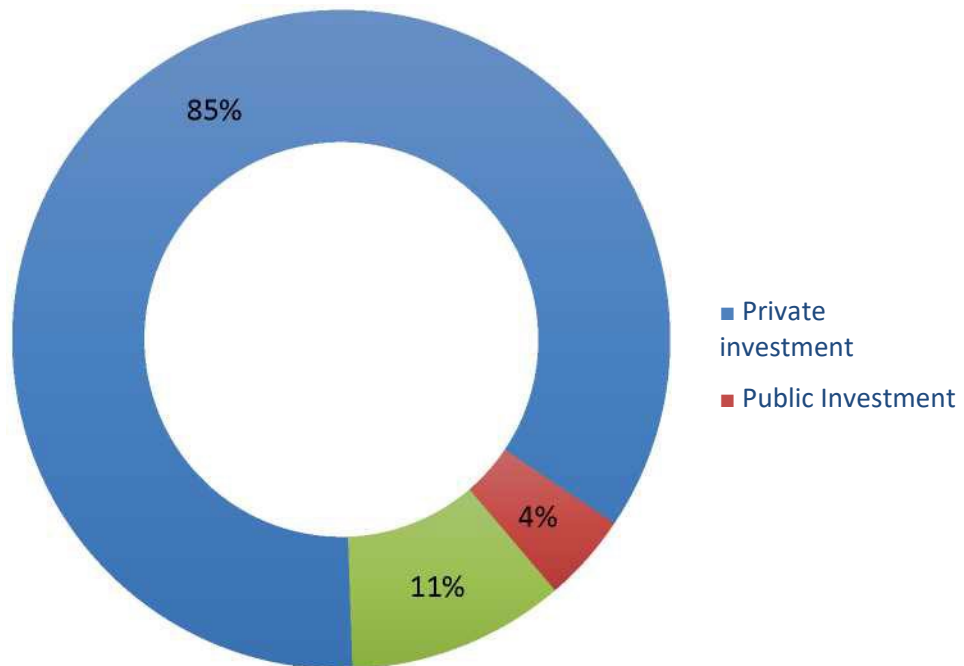


Source: BC3

<sup>149</sup>The additional investments are estimated at EUR 249 billion compared to a trend scenario.

<sup>150</sup>This is relevant for the economic impacts as, by how modelling has been carried out, European public investments do not have an impact at the level of the government deficit. By contrast, public investments financed by resources of the Spanish public administration imply a reduction in other items in order to comply with the public deficit path (a path that is exogenous and fixed).



**Figure 4.3. Distribution of total investments by source of financing**

Source: BC3

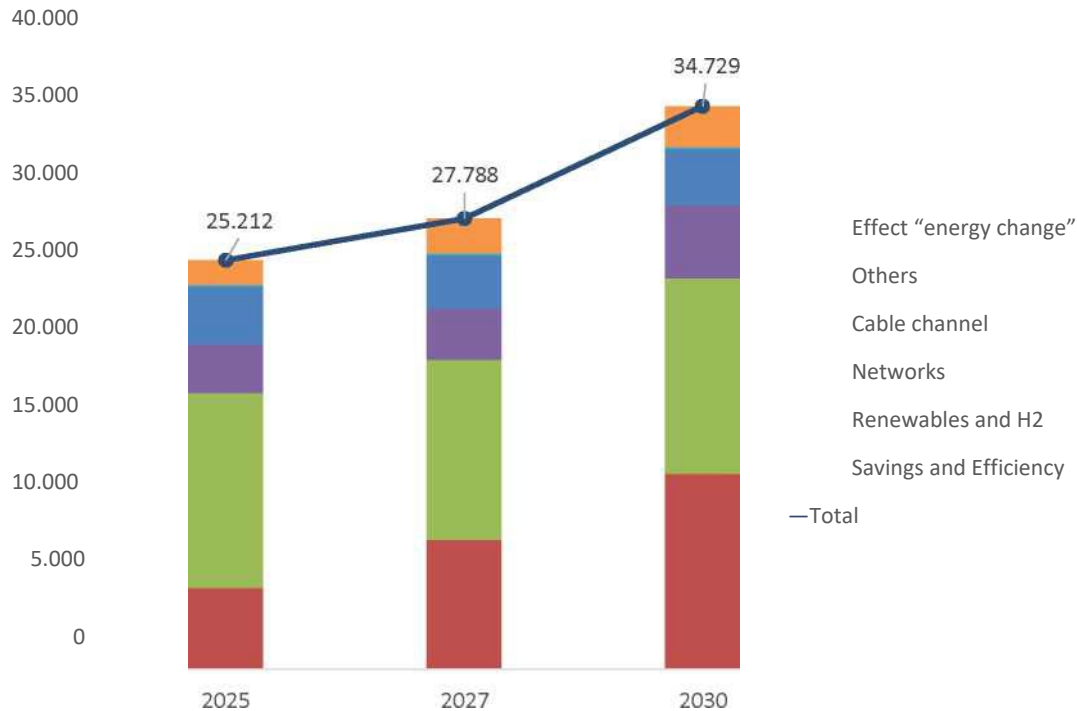
#### 4.4. SOCIO-ECONOMIC IMPACTS AND HEALTH

This section presents the results obtained at socio-economic and health impact level. Before analysing the results, a number of considerations need to be made. First, general government (general government) and households have been considered to have budgetary constraints in the modelling. For public administrations, the new general government deficit targets (2.5 % in 2026) set out in the 2023 Stability Programme 2026 of 28 April 2023 have been included. In the case of households, it has been considered that their borrowing capacity cannot increase compared to the trend scenario. Finally, in the case of the private sector, it is considered that there are no restrictions on financing and that financing will take place at the usual cost of capital.

##### 4.4.1. Impacts on GDP and employment

This section presents the socio-economic impacts of the NECP measures on GDP and employment. Figure 4.4 shows that IPB 151 would increase between 25.200 and 34.700 MEUR/year between 2025 and 2030. This represents an increase of 2.5 % in 2030 compared to the trend scenario.

<sup>151</sup>All data refer to constant 2014 prices.

**Figura 4.4. Change in GDP by type of measures (MEUR/year)**

Source: BC3

The results of the figure are determined by two main effects. First, by the effect of the inversiones<sup>152</sup>. These investments represent increases in aggregate demand and lead to an increase in economic activity during their execution, explaining most of the impacts that lead to an increase in economic activity during their execution and which explains most of the impacts.

Secondly, by the effect associated with 'energy change'. This effector <sup>153</sup> includes the impact of energy savings that free up resources and in turn lead to higher spending on other goods and services. It also includes the impact of the change in the energy mix that generates higher domestic added value by replacing (imported) fossil fuels with domestically installed renewables. The impact of this effect is initially small, but it grows towards 2030 when investments in saving and efficiency and in renewables are having an effect and fossil fuel prices are higher. In fact, the reduction in the consumption of imported fossil fuels results in cumulative savings up to 2030 of EUR 90.700 billion until 2030 for the Spanish economy as a whole.

The effect of the investments is maintained while they are being implemented, while the effect of the energy change 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.

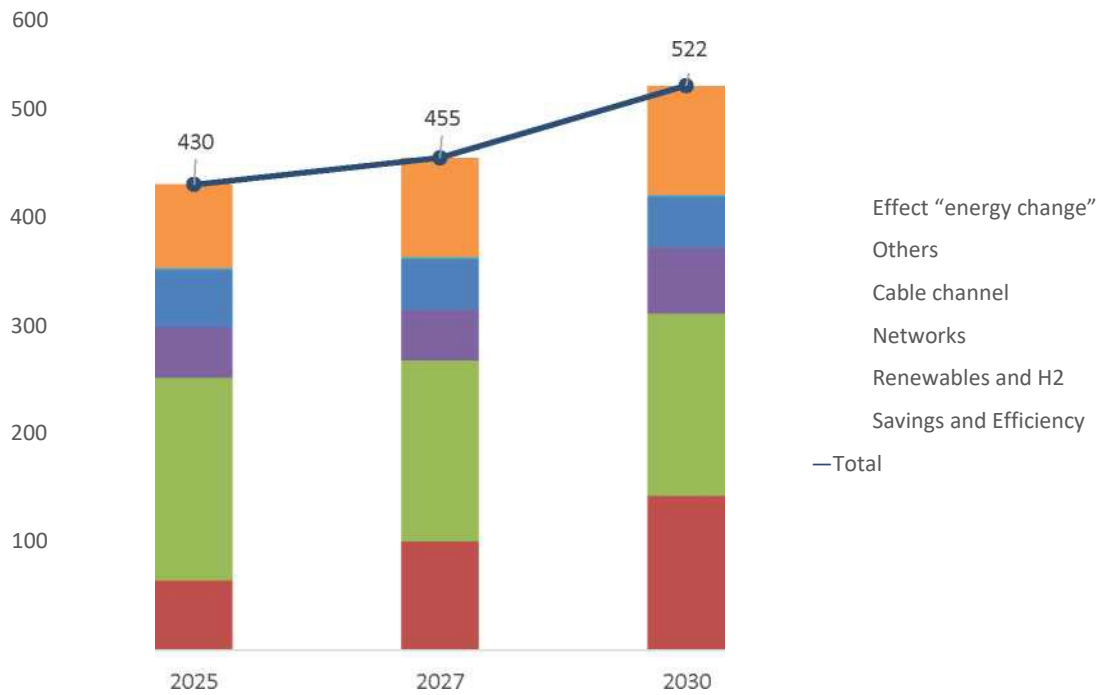
<sup>152</sup> It is important to note that not all investment is transformed into added value and job creation within Spain, since a part (around 20 % and depending on the sectors) needs goods that are imported, and therefore a part of the economic impact occurs outside the country, which the model allows to capture in detail and which is already reflected in the results.

The integrated (energy and economics) and multi-sectoral<sup>153</sup> nature of the DENIO model makes it possible to capture this effect.

Each impact figure should therefore be associated with the year in question, which is when the investments materialise.

As regards impacts on employment, Figure 4.5 shows that the total number of persons employed would increase between 430.000 and 522.000 persons/year in the period 2025 to 2030. This represents an increase in employment of 2.6 % in 2030 compared to the trend scenario.

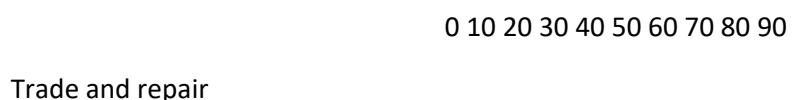
**Figura 4.5. Impact on employment by type of measures (thousands of persons/year)**



As in the case of GDP, the impact on employment is mainly due to the effect of investments in renewables and savings 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 168.000 and 196.000 jobs/year, while investments in energy saving and efficiency would generate between 89.000 and 143.000 jobs/year. Investments in networks would generate between 47.000 and 62.000 jobs/year and electrification between 47.000 and 53.000 jobs/year. Finally, the change in the energy mix would indirectly generate up to 101.000 jobs in 2030.

Figure 4.6 shows the jobs generated by industries according to the National Classification of Economic Activities. The industries where most employment would be generated are Trade and Repair (89.000 jobs in 2030), Industri a154 and Energy (71.000 jobs in 2030) and Construction (56.000 jobs).

**Figura 4.6. Impact on employment by area of activity (thousand persons/year)**

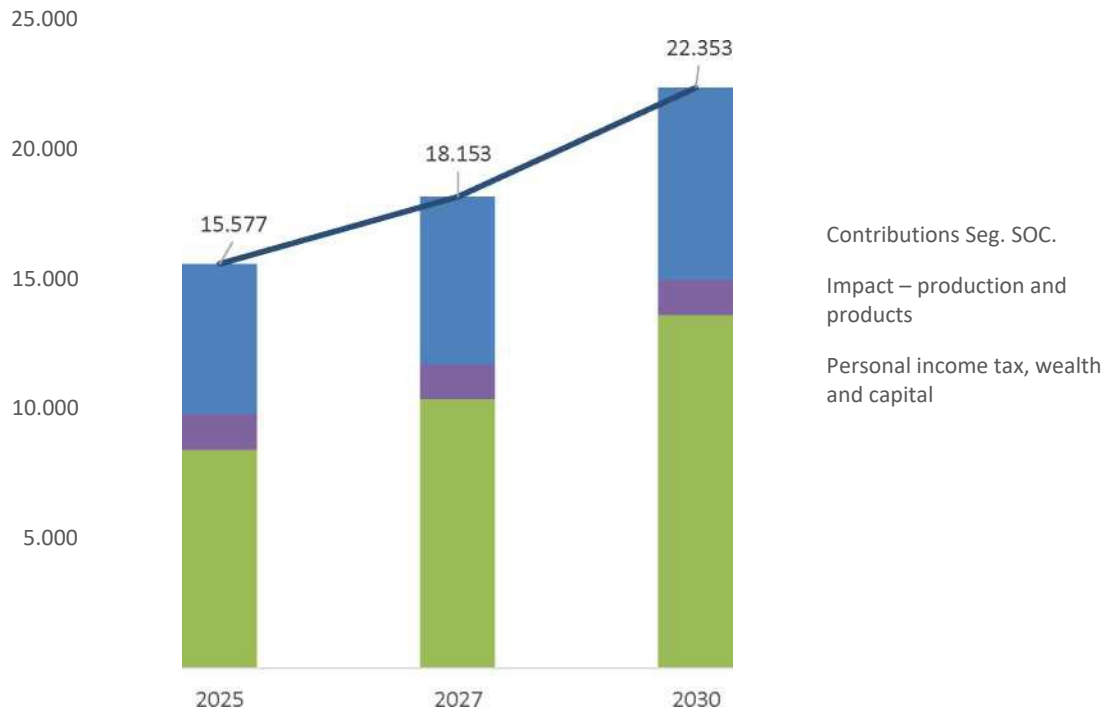


154The industrial sector (C) includes the extractive industry (B), electric (D) and water (E).

Industry and energy  
     Construction  
         Hospitality  
     Public Administration and defence; SEG. SOC.  
     Activities of households  
 Administrative activities and services...  
         Education  
     Professional, scientific and... activities  
 Health and social service activities  
     Information and communications  
     Transportation and storage  
         Other services  
 Agriculture, forestry and fishing  
     Artistic and leisure activities  
     Financial and insurance activities  
         Real estate activities

*Source: BC3*

The increase in economic activity induced by the NECP has a positive impact in terms of revenue collection, maintaining the same tax rates. As Figure 4.7 shows, government revenue would increase by between EUR 15.500 billion and EUR 22.300 billion per year between 2025 and 2030. Indeed, as Figure 4.8 shows, this additional revenue would more than cover the public resources needed to finance the NECP (between EUR 1.200 billion and EUR 1.400 billion per year) and would allow these additional resources to be allocated to other public authorities' expenditure. In this regard, it should be noted that the financing of the NECP in Figure 4.8 includes only Spanish public funding, which accounts for 30 % of all necessary public investment, as the rest (70 %) comes from European funds.

**Figura 4.7. Impact on public sector accounts: revenue (MEUR)**

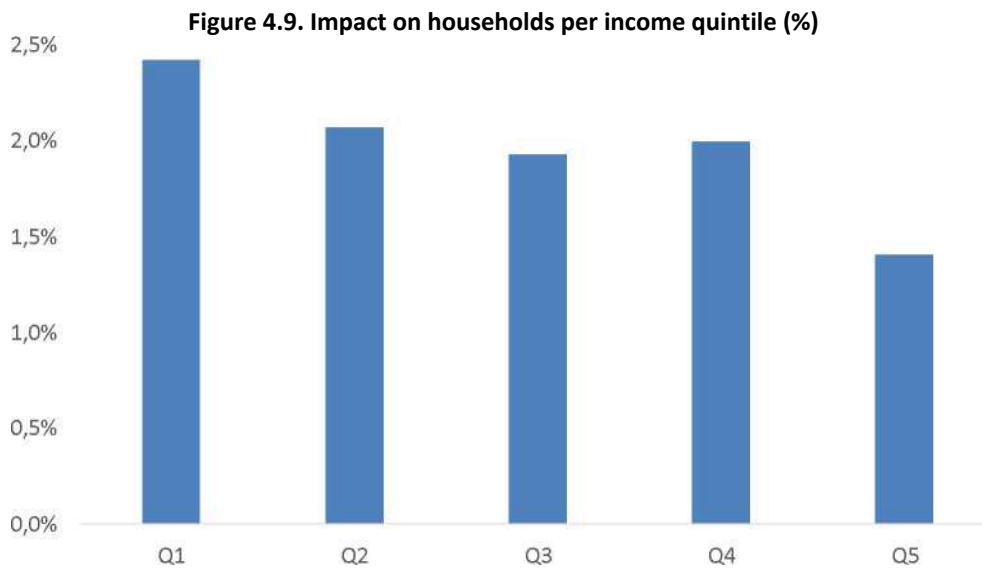
Source: BC3

**Figure 4.8. Impact on public sector accounts: expenditure (MEUR)**

Source: BC3

Finally, in the case of social impacts, the results show that the economic effects are beneficial for all households, but relatively more for lower-income households. Figure 4.8 shows that disposable income would increase in all quintiles but to a greater extent in lower-income

quintiles. Quintile 1 and 2 would increase their income by 2.4 % and 2 % respectively, compared to a 1.4 % increase in quintile 5. This effect is mainly explained by the fact that the lowest quintiles capture a higher share of the new wage income generated as a result of the increase in employment.



#### 4.4.2. Health impacts

This section lists co-benefits in terms of health. Policies aimed at reducing greenhouse gas emissions (GHGs) often have positive effects on public health by reducing 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 greatest health effects are fine particulate matter (PM<sub>2.5</sub>) and ground-level ozone (O<sub>3</sub>). PM<sub>2.5</sub> is the main cause of premature deaths attributable to poor air quality and causing problems in respiratory systems (lung cancer), cardiovascular or cerebral systems (ischaemic attacks). For ground-level ozone (O<sub>3</sub>), although typically associated with damage to agricultural systems, it also has significant negative health effects, mainly due to respiratory diseases.

The concentration of these pollutants depends to a large extent on primary emissions from economic activity, interaction between them and their transport at spatial level. The main direct air pollutant is primary PM<sub>2.5</sub> emissions, for which biomass is the main emission source. Other air pollutants such as sulphur dioxide (SO<sub>2</sub>) and nitrous oxides (NO<sub>x</sub>), which are the main air pollutants causing the formation of secondary PM<sub>2.5</sub>, originate

---

Pollution rates<sup>155</sup> are higher in Spain than those indicated by agencies such as the World Health Organisation (WHO): 5micr/m<sup>3</sup>.

mainly from other activities such as coal burning in industry (this is the case for SO<sub>2</sub>) and from other industrial processes and the transport sector (this is the case for NO<sub>x</sub>).

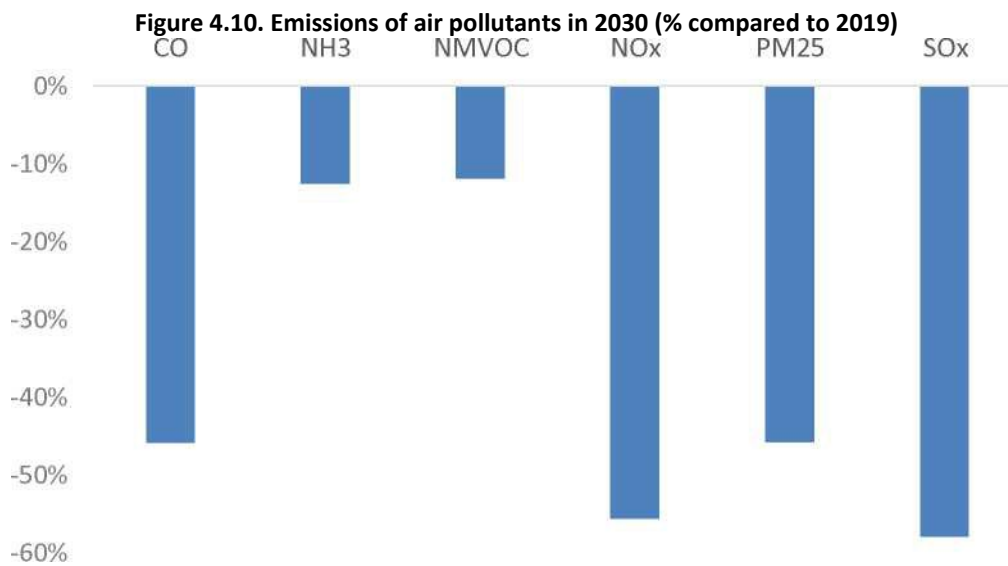


Figure 4.10 shows the change in the main air pollutants in the target scenario compared to 2019. As can be seen, SO<sub>2</sub>, NO<sub>x</sub> and PM<sub>2.5</sub> emissions are reduced by 58 %, 54 % and 44 % respectively. The remaining emissions are also reduced, albeit to a lesser extent, as they need additional and specific pollution control measures that are not so directly associated with EIG mitigation policies.

These reductions lead to a reduction in harm to public health. This reduction in damage has been measured by premature deaths resulting from environmental pollution using the TM5-FASST model in Spain, which makes it possible to capture how emission reductions lead to a reduction in concentrations, and thus to a reduction in premature deaths due to poor air quality using integrated exposition-response functions (Burnett et al. 2014).

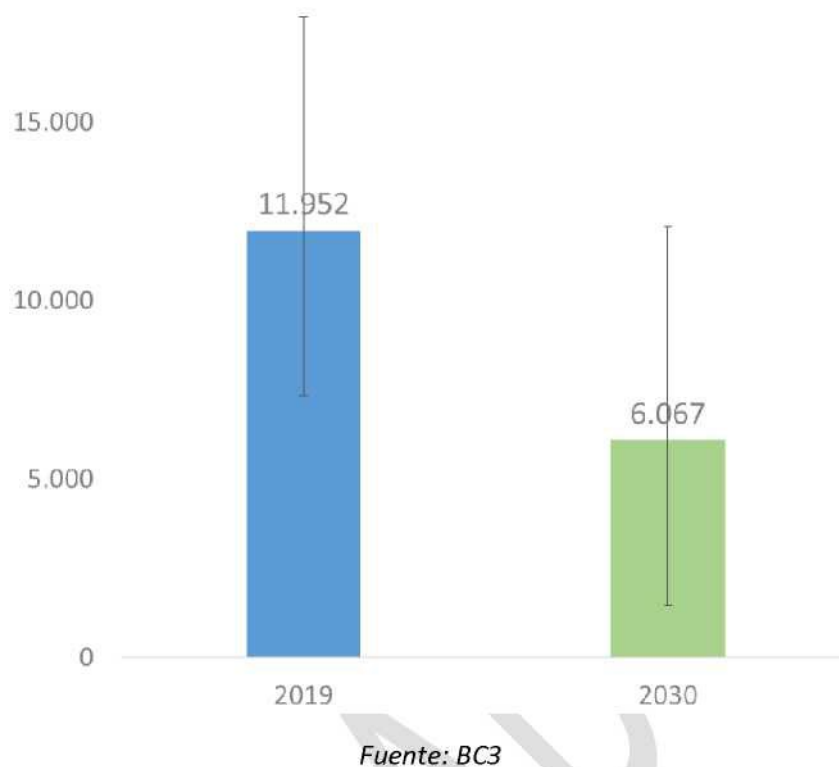
**Figure 4.11. Impact on health (premature deaths)**

Figure 4.11 shows premature deaths resulting from air pollution in 2019 and those projected for 2030. In Spain, according to the latest study by the Global Burden of Disease, it is estimated that in 2019 deaths from air pollution reached 11.952, of which 9.058 would be associated with exposure to PM<sub>2.5</sub> and 2.894 would be associated with exposure to O<sub>3</sub>. The series of measures implemented in the NECP means that premature deaths by 2030 are reduced, taking median values, to 6.067 premature deaths, a reduction of 5.885 premature deaths. In 2030, these values represent a reduction of 49 % compared to the 2019 values.

#### 4.5. SENSITIVITY ANALYSIS

This section provides an analysis<sup>157</sup> of sensitivity of macroeconomic performance. The impact analysis depends on multiple variables with varying degrees of uncertainty. Although many elements and parameters are used in modelling, factors associated with energy prices have been chosen for this sensitivity analysis, as energy prices are one of the most uncertain ones, as demonstrated by the recent energy crisis. To this end, the effect of an alternative path on fossil fuel prices has been analysed.

The prices used in the impact analysis, the results of which are shown in previous sections, come from European Commission estimates. These prices have to be used by all Member States in the preparation of their respective NECPs.

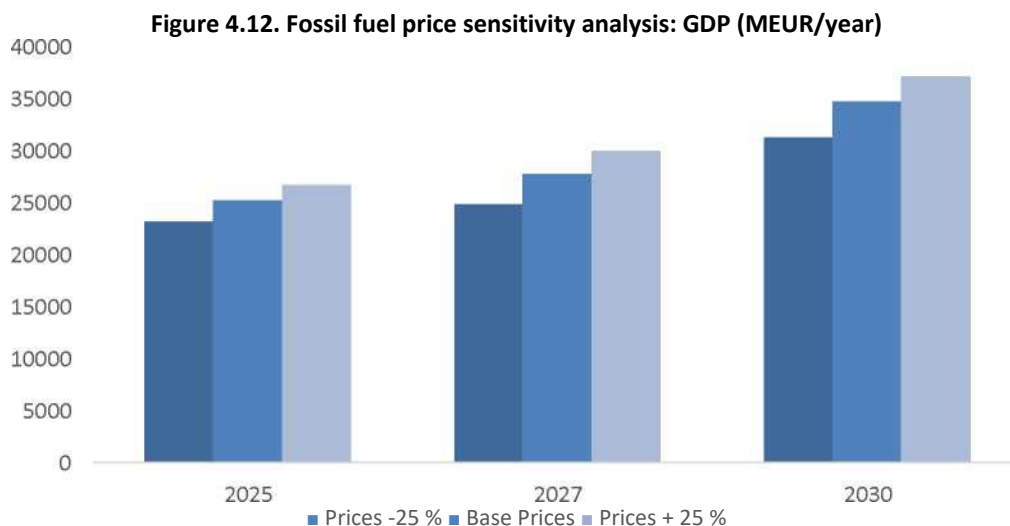
In this sensitivity analysis we compare the European Commission's central price scenario with two alternative scenarios with a  $\pm 25$  % variation in fossil fuel prices (coal, oil and its derivatives, and natural gas). This sensitivity analysis makes it possible to assess a wider range of future situations.

<sup>156</sup><https://vizhub.healthdata.org/gbd-compare>

The sensitivity analysis<sup>157</sup> was carried out only on the DENIO economic model, but not on the TIMES-SINERGIA model.

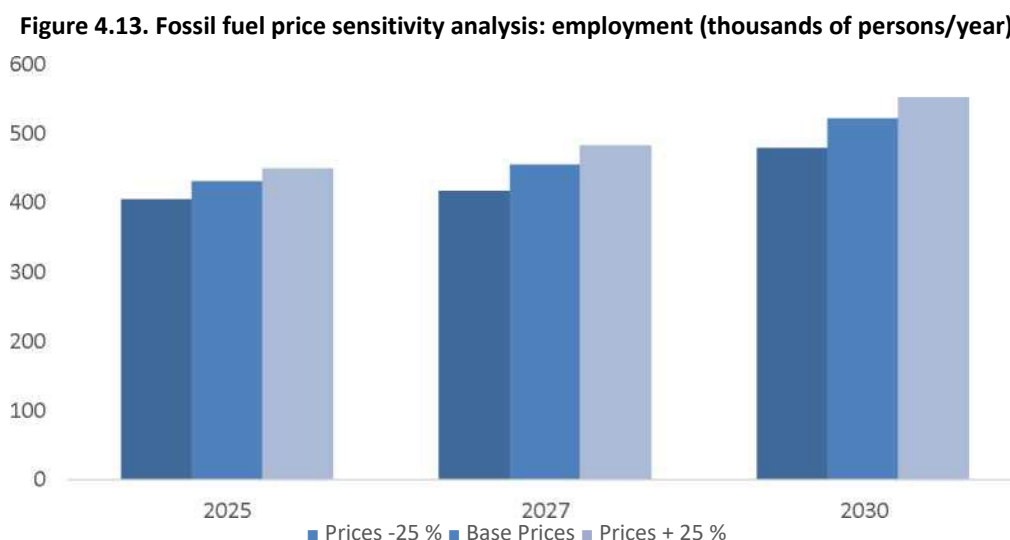


Figure 4.12 shows the results of the impact of the NECP on GDP in the different fossil fuel price scenarios. It is noted that a lower increase in fossil fuel prices also increases the impact in terms of GDP, and vice versa. A 25 % reduction in prices leads to a reduction of 10 % in terms of GDP, while a 25 % increase is an increase of 7 %. This is because the change in the price of fossil fuels ultimately affects the reduction in energy bills resulting from savings and efficiency measures. Thus, in an environment of high energy prices, the savings on energy bills resulting from the PNIEC actions will be greater, 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.



Source: BC3

Figure 4.13 shows the results in terms of employment. The jobs created would rise from 522.000 people/year in the central scenario in 2030 to a range of 479.000-552.000 persons/year. A 25 % price reduction creates a 8 % reduction in jobs created, while a 25 % increase means a 6 % increase in jobs. The reasons for this higher/lower increase are the same as those stated for GDP.



Source: BC3

## 4.6. LIMITATIONS

This section sets out the main assumptions and limitations of the results achieved in terms of socio-economic impact and health.

First, additional investment largely determines performance, stimulating employment and economic activity by boosting aggregate demand. In this case, the additional investments have been estimated to amount to EUR 249.000 billion, or 83 % of total investments. 158

. An increase/decrease of these additional investments will lead to an increase/decrease of the impacts shown. In addition, investments have a component of uncertainty inherent in any forecast at 2030 and which depends, among other factors, on factors such as the expected cost reduction in different technologies.

Second, it is important to bear in mind that potential effects on competitiveness have not been considered. In this regard, it has been assumed that the price differential between domestic production and imports remains constant, as it is assumed that the rest of the surrounding countries 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 regard, the lower relative cost of renewable energy expected for Spain can lead to improvements in competitiveness, especially for energy-intensive industries (AIR 2023). However, these phenomena are difficult to capture and the choice has been made to maintain a neutral approach to competitiveness.

Thirdly, the investment matrices by goods and sectors that have the (limited) level of disaggregation allowed by the NSI (top- down approach) have been used to study impacts. An alternative approach could have been to characterise the structure of the investment or value chains 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 straightforward for all technologies and measures.

Finally, the estimates of the TM5-FASST model have some technical limitations for its 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 use the proportion of premature deaths between the two countries resulting from pollution for the year 2019 published by the GBD and we maintain this constant proportion. Finally, the exhibition/response functions used by the model are those described in Burnett et al. (2014). However, further research shows that the damage of the continuation could be underestimated, and indeed the premature deaths estimated by the Environmental Agency Europe a159 are higher than the WHO estimates.

## 4.7. CONCLUSIONS

In this analysis, it has been possible to estimate the benefits of implementing the NECP in Spain, in terms of macroeconomic and public health. These results are similar to those obtained by other previous studies by various international organisations (IEA 2023, IRENA 2018 or OECD 2017).

On the basis of the analysis carried out, it can be concluded that:

- Impact on investments: it is estimated that a cumulative investment of EUR 294.000 billion until 2030 is needed to achieve the objectives of the NECP.
- Macroeconomic impacts: GDP increased by 2.5 % in 2030 compared to the trend scenario. Job creation is between 430.000 and 522.000 people/year. At industrial level, the number of jobs is between 66.000 and 71.000 jobs per year. However, as noted

---

Potential crowding-out effects are<sup>158</sup> not incorporated in the modelling.

<sup>159</sup><https://www.eea.europa.eu/publications/air-quality-in-europe-2022/health-impacts-of-air-pollution>

above, the generation of economic activity and employment will also depend on the ability of sectors to seize existing opportunities and minimise risks.

- Social impacts: the impacts are beneficial for all households, but relatively more so for lower-income households.
- Health impacts: emissions of air pollutants are significantly reduced. Premature deaths would decrease by 49 % in 2030 compared to 2019, from 11.952 premature deaths to 6.067.

## BIBLIOGRAPHY

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., 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 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. <https://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., 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.

Markandya, A., Sampedro, J., Smith, S.J., Van Dingenen, R., Pizarro-Irizar, C., Arto, I., González-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. <https://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 shortened climate pollutants. *ATMOS Chem PHYS* 18, 16173 – 16211.

## ANNEX A. STATE OF PLAY AND PROJECTIONS: 2023-2030 NECP SCENARIO

Table A.1 shows the main results of the 2023-2030 PNIEC Scenario in relation to the existing and new European objectives defined in the 'Objective 55' and 'REPowerEU' packages. The outline conditions defined in the Scenario are presented throughout the Annex, as well as the detailed analysis of the above results.

**Table A.1. Comparison of objectives and results between the 2021-2030 NECP and the document updated**

		Results in 2030	
		2020 NECP	2023 NECP
General	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 %	– 43 %
	Share of renewables in electricity generation	74 %	81 %
	Number of electric vehicles	5 million	5,5 million
	Number of dwellings renovated	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 %	– 42 %
	Energy efficiency Reduction of final energy consumption	– 41.7 %	– 44 %
	Energy dependency	61 %	51 %
Transport	Reduction of transport GHG emissions intensity	–	– 16.6 %
	Share of renewables in the transport sector	15 % *	25 %
	Combined percentage of RFNBO <sub>160</sub> + Advanced BIOS and biogas in Annex IX Part A	2.1 %	11 %
Industry	Annual increase in renewable energy in industry	1.1 %	5.1 %
	Share of RFNBO on hydrogen in industry	25 % * *	74 %
Building, cooling heating	Final energy from renewables in buildings	–	73 %
	Annual increase in renewable percentage of heating and cooling	0.83 % (2021-2025) 1.19 % (2026-2030)	1.27 % (2021-2025) 2.07 % (2026-2030)

\* In the amendment to the Renewable Energy Directive, a change in the methodology for calculating this term has been established, so that the 28 % established in the previous NECP is 15 %.

\* \* renewable Hydrogen Road Sheet

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

### 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 foresight exercise carried out in the Plan, in accordance with Regulation 2018/1999 on the Governance of the

160RFNBO: Renewable fuels of non-biological origin. Renewable fuels of non-biological origin.

Energy Union and Climate Action.

### Macroeconomic forecasts: GDP and population growth

The GDP variable has been projected 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 Spain's Gross Domestic Product (thousand MEUR, constant 2016 prices)				
Years	2019	2020	2025	2030
<b>GNI</b>	1.197	1.060	1.235	1.345

*Source: Ministry of Economic Affairs and Digital Transformation, 2022*

The GDP projection beyond the horizon contained in the stability programme corresponds to the macroeconomic scenario, constructed on the basis of the input-output tables of the Spanish economy. This scenario, which forecasts GDP growth of 27 % in the decade 2020-2030, uses as a starting point the evolution of the population referred to in the European Commission's report: "The 2021 Ageing Report: Economic and Budgetary Projections for the EU Member States (2019-2070)" 161.

The population projection contained in the Plan is derived from the Commission's projections (EUROPOP2018) corrected by the actual population data from the INE. As can be seen from the table below, the Spanish population grew by 2.15 % in the decade.

**Table A.3. Projection of the Spanish population**

Projection of the Spanish population (thousands of persons)				
Years	2020	2025	2030	
<b>Population</b>	47.332	47.846	48.352	

*Source: European Commission, National Institute of Statistics*

The number of dwellings is projected on the basis of previous population projections, using the population occupancy ratio per dwelling of the NSI. This path is consistent with that used in the future update of the 'Long-term Strategy for Energy Renovation in the Building Sector in Spain'.

In addition to the above, it is estimated that the total number of households is the same as 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 will exist in dwellings.

The total number of dwellings trajectory is shown below.

**Table A.4. Projection of the number of dwellings**

Projection of the number of dwellings (thousands of dwellings)				
Years	2016	2020	2025	2030
<b>Number of dwellings</b>	18.378	18.754	19.681	20.323

*Source: European Commission, National Institute of Statistics*

It should be noted that the number of dwellings includes renovated, new and existing dwellings.

<sup>161</sup>[https://economy-finance.ec.europa.eu/system/files/2021-10/ip148\\_en.pdf](https://economy-finance.ec.europa.eu/system/files/2021-10/ip148_en.pdf)

Details of the measures associated with the renovation of dwellings can be found in section 3.2 on the energy efficiency dimension.

### ‘Global Trends: International fossil fuel prices and allowance price

The Spanish energy system is part of global energy trends and markets, so the values of the starting variables considered have been those recommended by the European Commission.

The values used for international fossil fuel prices and their projections up to 2030 are presented below.

**Table A.5. International fossil fuel prices**

International fossil fuel prices (EUR at constant 2016/barril oil equivalent prices)				
Years	2020	2021	2025	2030
Petroleum	35,2	57,0	83,6	83,6
Gas	17,2	83,7	73,1	62,4
Coal	8,8	20,7	16,9	17,2

Source: European Commission

In line with the fuel price evolution scenario in the table above, the European Commission has also provided international prices for the projection of the cost of emission allowances.

In the case of CO<sub>2</sub>emission allowances placed on the European market system, the evolution of their prices is an exogenous variable in the model, so the recommended parameters presented in the table below have been used.

**Table A.6. Projection of the cost of the CO<sub>2</sub>emission allowance<sup>162</sup>**

International prices of greenhouse gas emission allowances (Units: EUR in constant 2016/tCO <sub>2</sub> prices)			
Years	2020	2025	2030
Cost of the allowance	22,81	76,04	76,04

Source: European Commission

### Evolution of technological costs

The analytical model used for the projection of the energy system, TIMES-Sinergia, is *bottom-up*, so the costs of the different energy technologies are a key input for making an appropriate projection of the different output variables of the model.

In order to ensure consistency of relative prices between the different technologies, data provided by the European Commission’s JRC in the Potential model have been preferred. For all the data not available in these two sources, commonly accepted international sources have been used, possibly adapting the values to the usual typology in the Spanish energy system.

The cost evolution of the different technologies has been taken from various international sources and, if available, from national expert sources. The main sources broken down by sector are summarised as follows:

**Table A.7. Data sources for technological cost evolution**

Sources of data	
Sector	Source of data

<b>Transport</b>	EU Reference Scenario 2016, Energy, transport and GHG emissions Trends to 2050. Input data to PRIMES model, 2016
<b>Residential</b>	Energy Technology Data Source, IEA ETSAP – Technology Brief, 2012
<b>Services</b>	JRC. Input data to POTEnCIA Model, 2018
<b>Electricity generation</b>	JRC. Power generation technology assumptions, developed to serve as input to the POTEnCIA
<b>Industry</b>	Energy Technology Data Source, IEA ETSAP – Technology Brief, 2010-2015

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

As regards heating and cooling days, these parameters have not been used in the modelling, and therefore the projections provided by the European Commission have not been used.

<sup>162</sup> data recommended by the European Union for the Reference Scenario. The values of the so-called ‘recommended EU ETS carbon prices’ are implemented.

## A.2 DECARBONISATION DIMENSION

Once the main exogenous variables have been set out, we have moved to the description of the Scenario of the different dimensions included in the Plan. This section starts with decarbonisation, which in turn consists of two areas: GHG emissions and the promotion of renewable energy.

### A.2.1 Greenhouse gas emissions and removals

The GHG emission reduction target of 32 % compared to 1900 is consistent with reaching climate neutrality by 2050 and contributing to the overall EU emission reduction target of 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 the end uses of energy are key levers.

The following tables present the total GHG emissions corresponding to the 2023-2030 PNIEC Scenario, detailed by sector.

Table A.8. Projection of total emissions in the 2023-2030 PNIEC Scenario

Emissions projection in the PNIEC 2023-2030 scenario (MtCO <sub>2</sub> eq)								
	Years	1990	2005	2015	2019	2020	2025	2030
<b>Transport</b>		58.650	102.840	83.746	91.426	73.873	82.554	59.424
<b>Production of electricity</b>		65.856	112.781	74.109	44.045	30.766	12.152	10.891
<b>Industrial sector (combustion)</b>		45.201	69.884	42.194	46.925	43.572	34.035	28.541
<b>Industrial sector (process emissions)</b>		27.345	31.509	20.591	18.535	16.897	16.844	16.810
<b>Residential, commercial and institutional sectors</b>		17.629	30.926	26.117	25.589	25.293	18.820	13.519
<b>Agriculture</b>		33.023	35.897	33.236	33.898	34.675	31.746	28.439
<b>Waste</b>		13.533	15.421	16.230	14.731	14.611	12.954	11.322
<b>Refining industry</b>		10.878	11.877	10.452	10.229	9.245	8.380	6.031
<b>Other energy industries</b>		2.117	1.036	655	989	786	815	760

<b>Other sectors</b>	9.092	11.744	12.712	12.752	12.699	12.413	11.621
<b>Fugitive emissions</b>	3.767	3.249	4.053	3.888	3.785	3.391	2.476
<b>Use of products</b>	552	957	641	919	943	1.023	1.068
<b>Fluorinated gases</b>	66	10.638	8.886	5.888	5.099	4.543	3.688
<b>Total</b>	287.710	438.760	333.623	309.814	272.244	239.669	194.590

\* The data for 2025 and 2030 are estimates from the 2023-2030 NECP.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In addition, emissions disaggregated 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 2023-2030 scenario.



Table A.9. Projection of emissions in sectors subject to emissions trading

Projected emissions in the 2023-2030 NECP scenario in sectors subject to emissions trading (MtCO <sub>2</sub> eq)							
	Years	2005	2015	2019	2020	2025	2030
Transport		3.998	2.487	3.127	1.516	4.920	5.008
Production of electricity		103.897	70.983	41.396	28.473	10.476	10.039
Industrial sector (combustion)		54.094	34.937	38.175	35.451	27.648	23.142
Industrial sector (process emissions)		28.440	17.841	15.811	14.297	14.343	14.373
Residential, commercial and institutional		46	99	111	109	79	65
Agriculture		0	0	0	0	0	0
Waste		0	0	0	0	0	0
Refining industry		11.877	10.452	10.229	9.245	8.380	6.031
Other energy industries		772	488	736	585	606	566
Other sectors		0	0	0	0	0	0
Fugitive emissions		1.498	2.578	2.465	2.395	2.185	1.572
Use of products		0	0	0	0	0	0
Fluorinated gases		0	0	0	0	0	0
Total ETS		204.621	139.864	112.051	92.070	68.638	60.796

\* The data for 2025 and 2030 are estimates from the 2023-2030 NECP.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Table A.10. Projected emissions in diffuse sectors

Projected emissions in the PNIEC 2023-2030 scenario in diffuse sectors (MtCO <sub>2</sub> eq)							
	Years	2005	2015	2019	2020	2025	2030
Transport		98.841	81.259	88.299	72.358	77.634	54.415
Production of electricity		8.885	3.127	2.650	2.293	1.676	852
Industrial sector (combustion)		15.791	7.257	8.750	8.121	6.387	5.399
Industrial sector (process emissions)		3.069	2.750	2.724	2.600	2.500	2.438
Residential, commercial and institutional sectors		30.880	26.019	25.478	25.185	18.741	13.455
Agriculture		35.897	33.236	33.898	34.675	31.746	28.439
Waste		15.421	16.230	14.731	14.611	12.954	11.322
Refining industry		0	0	0	0	0	0
Other energy industries		265	167	253	201	208	194
Other sectors		11.744	12.712	12.752	12.699	12.413	11.621
Fugitive emissions		1.751	1.476	1.423	1.390	1.207	904
Use of products		957	641	919	943	1.023	1.068
Fluorinated gases		10.638	8.886	5.888	5.099	4.543	3.688
Total		234.139	193.759	197.764	180.174	171.032	133.794

\* The data for 2025 and 2030 are estimates from the 2023-2030 NECP.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

As can be seen from the tables above, the main GHG emission reductions occur in the electric power generation, mobility and transport sectors. The industrial and residential, commercial and institutional sectors also make an important contribution to meeting the emission reduction target.

In conclusion, the central target set in this Plan is to reduce GHG emissions by at least 32 % by 2030 compared to 1990.

## A.2.2 Renewable energy

Below are the results and projections of the contribution of energy production from renewable sources to final energy consumption.

**Table A.11. Share of renewable energy in final energy consumption in the PNIEC 2023-2030 scenario**

Share of renewable energy in final energy consumption in the PNIEC 2023-2030 scenario							
Years		2019	2020	2022	2025	2027	2030
Electric power End-use EERR (excluding electricity renewable)	Agriculture (ktoe)						
	Industry (ktoe)						
	Residential (ktoe)	6.114	5.753	5.991	7.206	7.682	8.397
	Services and others (ktoe)						
	Transport (ktoe)						
<b>Energy supplied by heat pumps (ktoe)</b>		849	960	1.158	1.727	2.100	2.659
<b>Renewable electricity generation (ktoe)</b>		8.820	9.747	11.488	17.965	20.736	24.893
<b>Total renewable energy (ktoe)</b>		15.783	16.312	18.8636	26.897	30.518	35.949
<b>Final energy corrected by electricity system losses, aviation consumption and energy supplied by pumps of heat (ktoe)</b>		88.413	77.561	83.299	82.952	79.816	75.111
<b>Share of renewable energy in final energy consumption</b>		17.9 %	21.0 %	22.37 %	32.4 %	38.2 %	47.9 %

\* The data for 2019 and 2020 are real, the rest are projections made by MITECO.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

The table above shows how a share of renewable energy in gross final energy consumption is 48 % in 2030.

The main causes of this increase are as follows:

- The contribution of renewable electricity generation in the scenario is 33 %, as a result of policies to promote renewable generation.
- The contribution of heat pumps increases by 177 % compared to 2020.

Energy savings and efficiency gains increase the contribution of renewables in percentage terms, due to their effect on the reduction of final energy consumption.

The sectoral breakdown of renewable energy will then be presented.

### Renewable energy in heat and cold applications

Heat and cold applications include the following sectors: residential, services and industrial.

The following table presents the results of this contribution.

**Table A.12. Share of renewable energy in heat and cold**

Share of renewable energy in heat and cold applications				
Years	2019	2020	2025	2030
<b>2023-2030 NECP scenario</b>	17%	18%	24%	35%

\* The data for 2019 and 2020 are real, the rest are projections made by MITECO.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In the results of the above table, and in a manner consistent with the evolution of the overall

percentage, the PNIEC 2023-2030 scenario shows an increase in the share of renewable energy in heat and cold in 2030. The main findings in this respect are set out below:

- The promotion of the use of end-use renewable energy, such as biomass, biogas and solar thermal energy, has a significant impact on raising this percentage.
- Increased penetration of heat pumps for air conditioning by installation in new dwellings, as well as in a significant number of renovated dwellings, also has a significant impact.

### **Transport**

The following table shows GHG emission intensity savings from the use of renewable fuels in transport:

**Table A.13. GHG emission intensity reduction from the use of renewable fuels in transport sector**

Reduction of GHG intensity in transport				
	Years 2019	2021	2025	2030
<b>2023-2030 NECP scenario</b>	2.25 %	3.12 %	7.35 %	16.61 %

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

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.14. Share of renewable energy in the transport sector**

Share of renewable energy in the transport sector				
	Years 2019	2020	2025	2030
<b>2023-2030 NECP scenario</b>	5 %	8 %	12 %	25 %

*\* In 2019 and 2020, the methodology of Directive 2009/28/EC was applied, the rest being projections made by MITECO using the methodology of Directive 2018/2001.*

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

The main causes leading to a very significant reduction in GHG emission intensity from the use of renewable fuels and a very significant increase in the presence of renewable energy in transport are analysed below:

- **Modal shift towards more efficient modes of transport and increased deployment of teleworking.** The change of mode of transport envisaged in the 2023-2030 PNIEC Scenario towards collective means of transport results in a much more efficient sector, which, together with the increase in teleworking, leads to an increase in ambition in the transport objectives.
- **Accelerated introduction of the electric vehicle in the PNIEC 2023-2030 scenario.** In 2030, there will be a total of 5,5 million electric vehicles in the fleet, with electric cars, motorcycles, light lorries and buses. The introduction of electric mobility is gradual to reach this figure by 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*, there will be 2 commercial lines for hydrogen-powered trains in 2030, specifically when electrification is not feasible.
- **Use of advanced biofuels and biomethane.** The contribution of these fuels produced

from the feedstocks listed in Part A of Annex IX to Directive 2018/2001 complies with the minimum laid down.

- **The increase of sustainable aviation fuels (SAF) in aviation** in line with the targets set in the latest version of the ReFuelEU Aviation Regulation, which estimates 5 % biofuels, of which 0.7 % will be synthetic.
- With regard to the **maritime sector**, the FuelEU Maritime Regulation, also in trilogues at the time of drawing up this draft, establishes a pathway for reducing greenhouse gas emissions for the energy consumed in ships, with biofuels, biomethane and e-methanol being the main technological routes considered for their decarbonisation.

The following table presents the different limits laid down in Directive 2018/2001 on the promotion of the use of energy from renewable sources and the degree of compliance therewith. As can be seen from the data submitted, the minimum and maximum contribution of biogas and biofuels laid down by the Directive in 2030 is complied with.

**Table A.15. Compliance with the limits laid down in Directive 2018/2001 in the transport sector**

Compliance with the limits laid down in Directive 2018/2001 (RED III)					
Component	2019	2020	2025	2030	Objective 2030
<b>Article 27 (1) b</b> Biogas and biofuels. Annex IX, Part B	0.6 %	2.0 %	1.4 %	1.5 %	Maximum 1.7 %
<b>Article 25.1</b> Advanced biogas and biofuels. Annex IX, Part A	0.1 %	0.5 %	6.1 %	7.5 %	Minimum 3.5 %
<b>Article 26.1</b> Biofuels produced from food and feed crops	5.2 %	4.0 %	2.6 %	2.6 %	Maximum 7 %
<b>Directive DERIII**</b> Advanced biogas and biofuels. Annex IX, Part A and RFNBO		0.2 %	7.2 %	11.1 %	Minimum 5.5 %

\* In 2019 and 2020, the methodology of Directive 2009/28/EC was applied, the rest being projections made by MITECO.

\*\* objective set out in the amendment to Directive 2018/2011 under negotiation

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Furthermore, **Order TED/1342/2022 introduced** a limitation on biofuels produced from food and feed crops of 3.5 %, 3.0 % and 2.6 % in 2023, 2024 and 2025 respectively.

In this respect, soybean and palm will be replaced by advanced biofuels in Annex IX (A). These feedstocks will be fully removed in 2025 and the biofuel production of feedstock listed in Annex IX (A) of Directive 2018/2001 will take over the reduction that is produced from biofuels produced from food and feed crops.

## **Renewable energy in the electricity sector**

This paragraph starts with the results for renewable energy generation in the power generation park, which are shown below:

**Table A.16. Share of renewable energy in the electricity generation sector**

Share of renewable energy in electricity generation				
Calculation method	2019	2020	2025	2030
<b>Directive 2018/2001</b>	37 %	44 %	72 %	92 %
<b>Direct percentage</b>	37 %	43 %	69 %	81 %

\* The data for 2019 and 2020 are real, the rest are projections made by MITECO.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

In Error! **The origin of the reference is not found. The percentages of renewable generation in the electricity sector compared to final energy** are presented, applying the direct ratio calculation, as well as under the methodology laid down in the Renewable Energy Directive. In

the case of the direct percentage, a renewable contribution of 81 % is reached in the year 2030, which is obtained by dividing the renewable energy supplied by the system by the total energy.

A detailed presentation on the electricity sector is provided below, as this is one of the most important parts of the contribution to the decarbonisation of the energy system as well as to the achievement of the renewable energy target.

### Electrical sector

In the PNIEC 2023-2030 scenario, 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 subject to change in the light of technological developments, costs and availability of the various technologies. Similarly, these figures include the different typologies of existing and future technologies, which can be cited as examples and are not exclusive: distributed generation and conventional generation, onshore and offshore wind power, large photovoltaic generation plants and self-consumption. These figures also include the powers dedicated to electrolyzers.

**Table A.17. Electricity generation park in the PNIEC 2023-2030 scenario**

Scenario generation park. Gross power (MW)				
Years	2019	2020	2025	2030
Wind *	25.083	26.754	42.144	62.044
Solar photovoltaic **	8.306	11.004	56.737	76.387
Solar thermoelectric	2.300	2.300	2.300	4.800
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	8.828	18.543
<b>Total</b>	<b>111.101</b>	<b>115.015</b>	<b>166.939</b>	<b>213.963</b>

\* Including the storage of the thermoelectric solar is as high as 22 GW.

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

It is also worth noting the increase in storage technologies, which reached a total of 22 GW of storage in 2030, including both storage associated with solar thermoelectric generation plants and other storage technologies, exceeding the forecasts of the Energy Storage Strategy. This power is the result of an integrated approach combining different types of daily, weekly and seasonal storage to reduce spills and maximise the production capacity of non-manageable renewable technologies.

There is also an increase in other renewable technologies in the period under consideration, reaching a value of 80 MW, including geothermal and offshore energy.

In short, renewable capacity is increased by approximately 105 GW in the period 2021-2030, with the total renewable capacity on that date being 160 GW.

On the other hand, over the period 2021-2030 there was a decrease of 4 GW in installed nuclear

power (corresponding to four reactors out of the seven currently in operation). This decline is part of the plan for the orderly, phased and flexible cessation of operation of existing nuclear reactors, which provides for the cessation of operation of the other three reactors in the period from 2031 to 2035.

The target scenario of the current NECP foresaw the cessation of all coal-fired electricity generation by 2030. However, the latest economic, technical and regulatory developments have led to all coal-fired power stations in the country having now completed their closure, are in the process of being closed down or are subject to medium-term closure plans, so it is estimated that coal could be fully shut down 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 the cessation prior to 2030 will be the difficulty of coal heating to continue to be profitable in an environment strongly influenced by the European response to climate change in which the price of CO<sub>2</sub> tonne will be at least EUR 76. In any case, the completion of electricity generation from coal-fired thermal power plants is considered essential to achieve the central GHG mitigation objective of this National Plan, at least 32 % in 2030 compared to 1990.

It should also be noted that it is envisaged that the entire existing renewable stock will be repowered after the end of its useful life, based **on renovation and hybridisation measures in existing projects** incorporated in this NECP.

It should be noted that the primary objective of the electricity system is to ensure, in the best possible conditions of safety and quality of service, the supply of electricity to consumers. In accordance with the feasibility studies carried out in relation to the proposed generation park, **it will not be necessary to install additional back-up thermal input to supplement the generation mix obtained using the TIMES-Sinergi model asat<sup>163</sup>.**

In any event, REE, as System Operator, shall at all times ensure the proper functioning of the transmission and distribution networks and the guarantee of electricity supply.

Finally, and in line with the above, the high penetration of renewable power in the electricity generation system will be accompanied by the following actions:

- Development of energy storage as well as other flexible services such as demand-side management.
- Review at European level of the internal electricity market so that its future design ensures further investments in renewable energy, energy storage and demand-side management.
- 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 necessary for their implementation, especially in the case of repowering.

Once the power park has been exposed, the results for electricity generation at<sup>164</sup> are shown below:

<sup>3</sup> As can be seen from Annex D, the electricity generation park resulting from the TIMES-Sinergia model has been analysed by Red Eléctrica de España.

<sup>4</sup> The generation values for 2019 are based on the values reported to Eurostat for that year, and the necessary estimates have been made in accordance with the breakdown presented.

Table A.18. Gross electricity generation in the PNIEC 2023-2030 scenario

Gross electricity generation in the PNIEC 2023-2030 scenario (GWh)				
Years	2019	2020	2025	2030
Wind (onshore and offshore)	55.647	56.444	80.128	110.900
Solar photovoltaic	9.420	15.675	68.614	104.818
Solar thermoelectric	5.683	4.992	2.903	9.555
Hydraulic	24.646	30.507	31.147	31.140
Storage	2.228	3.491	9.665	14.522
Biogas	699	699	1.261	2.540
Geothermia	0	0	94	188
Marine energy	20	27	6	62
Coal	14.003	5.775	0	0
Combined cycle	57.614	45.916	13.778	17.601
Cogeneration coal	243	221	0	0
Gas CHP	29.025	27.177	15.092	13.123
Cogeneration of petroleum products	3.108	2.481	1.767	982
Other	988	1.152	1.837	1.682
Fuel/Gas	5.941	4.374	5.682	3.589
Renewable cogeneration	1.094	1.091	1.213	1.848
Biomass	3.009	3.646	4.147	6.530
Waste CHP	192	140	122	84
Solid urban waste	1.348	1.266	1.131	465
Nuclear	58.349	58.299	58.389	39.116
<b>Total</b>	<b>273.257</b>	<b>263.373</b>	<b>296.975</b>	<b>358.744</b>

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Table A.19. Electricity balance of the PNIEC 2023-2030 scenario

Electricity balance of Scenario 2023-2030 (GWh)				
Years	2019	2020	2025	2030
Gross electricity generation	273.257	263.373	296.975	358.744
Consumption in generation	− 9.461	− 8.782	− 7.754	− 8.450
Net electricity generation	263.796	254.591	289.221	350.293
Consumption in storage	− 3.025	− 4.620	− 10.584	—
Export	− 11.859	− 14.649	− 25.675	—
Importation	18.721	17.928	14.305	12.305
Demand in central bars	267.633	253.251	267.266	282.978
Consumption in the energy transformation sector	− 7.636	− 7.517	− 10.687	—
Transmission and distribution losses	− 24.790	− 25.631	− 25.860	—
Final electricity demand from non-energy sectors	235.207	220.103	230.719	237.915

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Main findings concerning the PNIEC 2023-2030 scenario:

- The final electricity demand is from 235 TWh in 2019 to 238 TWh in 2030, an increase of 1.2 %.
- The net border balance is clearly exported in 2030, reaching 51 TWh. This balance is driven by the high penetration of renewable power in the system.
- The share of renewable generation in the electricity sector increased by 44 percentage points in this period, from 37 % in 2019 to 81 % in 2030.

### A.3 ENERGY EFFICIENCY DIMENSION

This section refers to the effects of policies and measures on energy efficiency across sectors of



the economy. It has previously been pointed out that one of the vectors that guided the development of the Plan is the reduction of GHG emissions. For this purpose, two main directions can be distinguished from the measures proposed:

- Replacing fossil fuels with less polluting or more efficient energy sources.
- The reduction of energy consumption to meet the same demands, which is the same, the increase in energy efficiency, which is the subject of this section.

### A.3.1 Primary energy use

The following table contains the aggregated primary energy for all sectors for the PNIEC 2023-2030 scenario.

**Table A.20. Primary energy consumption including non-energy uses in the PNIEC2023-2030 scenario**

Primary energy consumption including non-energy uses in the Scenario (ktoe)				
Years	2019	2020	2025	2030
Coal	5.072	3.100	1.404	1.088
Oil and its derivatives	56.162	45.690	47.225	37.133
Natural gas	30.897	27.915	20.378	18.008
Nuclear	15.218	15.174	15.209	10.189
Renewable	17.516	18.129	28.010	39.631
Industrial waste	270	304	347	404
MSW (non-renewable)	256	236	203	86
Electricity	590	282	— 978	—
<b>Total</b>	<b>125.981</b>	<b>110.830</b>	<b>111.799</b>	<b>102.178</b>

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

These are the main conclusions in the above tables:

- Consumption of petroleum products and natural gas in **2019** exceeds 69 % of the total. The policies and measures included in the Plan are successful in reducing this dependence on hydrocarbons in the country's energy balance.
  - The impact of policies and measures to decarbonise the economy as well as the important introduction of renewables into the primary energy balance is reflected. The reduction in primary energy consumption in 2030 compared to 2019 is 19 %.
  - Renewable energy consumption more than doubled in 2030 compared to 2019.
  - Coal consumption is reduced to one-fifth of that which existed in 2019, mainly due to the gradual closure of coal-fired electricity generation plants.
  - The consumption of petroleum products is reduced by 34 % compared to 2019; natural gas is also reduced by 42 %.
  - The consumption of energy from nuclear technology is decreasing, accompanying the planned, staggered and orderly cessation of operation of the power plants.

### A.3.2 Final energy consumption

The projections for total final energy consumption for each of the sectors included in the model are presented below: industry, residential, services and transport.

**Table A.21. Final energy consumption including non-energy uses in the PNIEC 2023-2030 scenario**

Final energy consumption including non-energy uses in the PNIEC 2023-2030 scenario (ktoe)				
Years	2019	2020	2025	2030

Coal	481	414	272	236
Petroleum products	49.223	39.473	40.309	32.251
Natural gas	14.922	14.264	13.658	11.860
Electricity	20.166	18.887	20.947	22.072
Renewables	5.895	5.511	7.412	8.897
Other non-renewables	217	193	353	408
<b>Total</b>	<b>90.905</b>	<b>78.742</b>	<b>82.950</b>	<b>75.723</b>
Non-energy	5.352	5.804	5.117	5.514

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

The main comments on final energy consumption are presented below:

- The PNIEC 2023-2030 scenario shows a very significant decrease, close to 34 %, in the consumption of petroleum products. Due to all the proposed measures, the Spanish economy will become more efficient in 2030 and less dependent on oil.
  - Final energy consumption is reduced by around 17 % between 2019 and 2030, even though the economic path is always increasing. This implies that the proposed measures will further decouple economic growth from energy consumption.
  - Electricity consumption increases by around 9 % given the increased electrification of the economy as one of the decarbonisation drivers.
  - The estimated final consumption of petroleum products for 2030 is reduced by 34 % compared to the actual data for 2019, while natural gas consumption is reduced by around 21 %.
  - Renewable energy consumption increases by around 51 %.

In conclusion, the needs of the Spanish economy in 2030 will be met in a more energy efficient way.

### **Industrial sector**

The following table contains final energy consumption in the industrial sector.

**Table A.22. Final energy consumption in industry (excluding non-energy uses) for the PNIEC Scenario 2023-2030**

Final energy consumption in the industrial sector (excluding non-energy uses) for the PNIEC 2023-2030 scenario (ktoe)				
Years	2019	2020	2025	2030
Coal	307	265	215	192
Petroleum products	2.909	2.473	1.771	1.280
Natural gas	8.601	8.047	7.930	6.917
Electricity	6.528	5.923	7.008	7.259
Renewables	1.870	1.707	2.234	2.900
Other non-renewables	212	189	347	404
<b>Total</b>	<b>20.428</b>	<b>18.604</b>	<b>19.505</b>	<b>18.952</b>

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

With regard to industry in the PNIEC 2023-2030 scenario, the following points can be noted:

- This decline in final consumption is passed on directly to coal, petroleum products and natural gas, thus contributing to the reduction of GHG emissions from the industrial sector.

### Residential

The following table contains final energy consumption in the residential sector.

**Table A.23. Final energy consumption in the residential sector (excluding non-energy uses) for the PNIEC 2023-2030 scenario**

Final energy consumption in the residential sector (excluding non-energy uses) for the PNIEC 2023-2030 scenario (ktoe)				
Years	2019	2020	2025	2030
Coal	65	46	0	0
Petroleum products	2.398	2.456	1.424	385
Natural gas	3.457	3.474	3.509	3.124
Electricity	6.275	6.296	6.578	6.478
Renewables	2.088	2.105	2.094	2.541
<b>Overall total</b>	<b>14.283</b>	<b>14.377</b>	<b>13.605</b>	<b>12.529</b>

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

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 renewables is increasing.

### Services and Other

The following tables contain final energy consumption in the services and other sectors.

**Table A.24. Final energy consumption in services and others (excluding non-energy uses) for the PNIEC 2023-2030 scenario**

Final energy consumption in the services and other sectors (excluding non-energy uses) for the PNIEC 2023-2030 scenario (ktoe)				
Year	2019	2020	2025	2030
Coal	74	84	15	0
Petroleum products	1.285	1.153	779	506
Natural gas	1.990	1.926	1.554	1.278
Electricity	6.552	5.929	6.065	6.106
Renewables	228	225	387	509
Other non-renewables	5	5	6	4

<b>Total</b>	<b>10.133</b>	<b>9.322</b>	<b>8.806</b>	<b>8.403</b>
--------------	---------------	--------------	--------------	--------------

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

The main conclusions drawn from the services sector and others are increased efficiency as well as increased renewable energy consumption.

## **Transport**

The following tables contain final energy consumption in the transport sector.

**Table A.25. Final energy consumption in the transport sector (excluding non-energy uses) for the PNIEC Scenario 2023-2030**

<b>Final energy consumption in the transport sector (excluding non-energy uses) for the PNIEC 2023-2030 scenario (ktoe)</b>					
	<b>Years</b>	<b>2019</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
<b>Petroleum products</b>		35.623	25.735	29.612	23.389
<b>Natural gas</b>		213	210	139	95
<b>Electricity</b>		339	287	742	1.619
<b>Renewables</b>		1.631	1.402	2.313	2.184
<b>Total</b>		<b>37.806</b>	<b>27.635</b>	<b>32.807</b>	<b>27.286</b>

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

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 efficiency in the use of vehicles, the introduction of new more efficient vehicles and modal shift policies.
- There is also a significant decrease in the consumption of petroleum products, which are replaced by electricity.

## **Electrification of the economy**

There are a number of measures implemented in this Plan that contribute to the electrification of the economy. In a context where electricity generation has a high renewable contribution, electrification of the economy contributes to decarbonisation.

The electrification of final energy consumption (net of non-energy uses and international aviation) is increasing sharply in the PNIEC 2023-2030 scenario.

result of the measures implemented in this Plan. If 2019 is taken as a reference, the electrification indicator improves by 36 %.

Sectoral, the largest contribution to the electrification of the PNIEC 2023-2030 scenario compared to 2019 is in transport, with a relative increase in electricity consumption in the sector of 380 % between the two years, although electrification has 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 proposed in this NECP is equivalent to 1.9 % per year since 2019, which, linked to an expected increase in GDP in the same period of around 1.1 %, will result in **an improvement in the primary energy intensity of the economy by 2.9 % per year until 2030**. As regards final energy intensity, the **1.6 % reduction in final energy consumption per year since 2019** with projected GDP growth will result in a **reduction of 2.7 % per year in final energy intensity**.

**Table A.26. Primary and final energy intensities in the Scenario**

Energy intensities of primary and final energy (toe/MEUR base 2016)					
Years		2019	2020	2025	2030
2023-2030 NECP scenario	Primary energy intensity	105	104	90	76
	Final energy intensity	76	74	67	56

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

## A.4 Sectoral Route Strategies and Sheets

In order to develop some of the measures of the 2021-2030 PNIEC and Law 7/2021 of 20 May on Climate Change and Energy Transition, and also in line with the objectives set in the various European initiatives 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 field. Below, these roadmaps are briefly described and their forecasts compared with the projections estimated in this update of the NECP, which, in general, are far beyond the momentum of tools such as the PRTR and in particular the PERTE, the progress in implementing legislation that has been taking place in recent years, as well as the need to accelerate the energy transition in line with the increase in ambition at European level to which Spain has a strong commitment.

### Renewable Hydrogen Road Sheet

The Spanish Government approved the **Hydrogen Roadmap in October 2020: a commitment to renewable hydrogen**<sup>165</sup>, which sets 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 measures, of a regulatory and sectoral nature, for the deployment of this energy carrier in Spain, shaping, in defining terms, a country project through which Spain becomes a hydrogen-producing power through the development of a national industry covering the entire value chain. As, this Roadmap aims to boost the deployment of hydrogen generated from renewable energy sources.

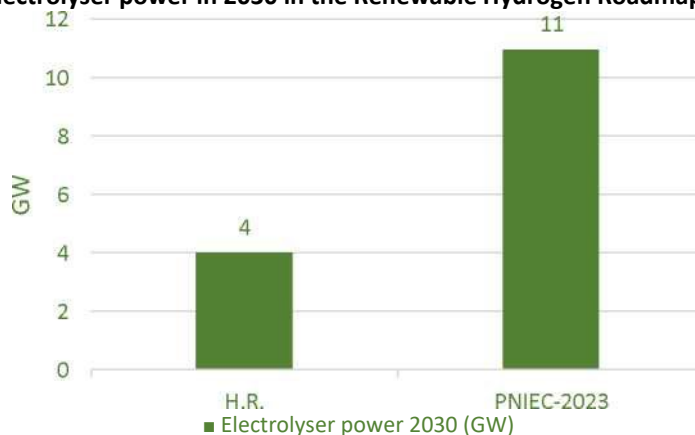
Furthermore, green hydrogen is one of the solutions for the energy transition driven by the Spanish Government's Transformation and Resilience Recovery Plan, and in particular through the ERHA PERTE.

<sup>165</sup>[Hydrogen Route Sheet: A commitment to the Renewable Hydrogen](#)

It outlines 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 of this energy carrier in the context of the green recovery.

As a result of the drive to green hydrogen stemming from these tools, and given their significant potential to decarbonise some of the hardest to abase sectors, forecasts for green hydrogen production have increased, spurring to reach 11 GW of electrolyzers by 2030. The following figure shows a comparison between the installed capacity of electrolysation plants in the Roadmap for 2030 and the forecast of this NECP for the same year.

**Figure A.1. Electrolyser power in 2030 in the Renewable Hydrogen Roadmap and the NECP**



*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

## Energy Storage Strategy

The Energy Storage Strategy<sup>162</sup>, 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 energy system model, 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 granting flexibility to the electricity system, as well as contributing to the management of electricity networks, the involvement of the public 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 different end uses such as thermal energy storage.

Electricity systems with high penetration of renewables have yet to solve some of the challenges associated with their integration. These include the use of spills and the provision of inertia of a rolling or synthetic type. 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.

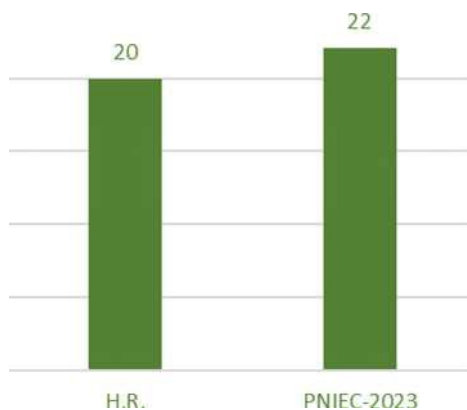
The 'Just and Inclusive Energy Transition' leverage policy of the Recovery, Transformation and Resilience Plan includes among its objectives the deployment of storage technologies. Within this policy, Component 8 should be highlighted: electricity infrastructure, promotion of smart grids and deployment of flexibility and storage, endowed with EUR 1.365 billion, whose main objective is to ensure the transformation of the energy system to ensure that it is flexible, robust and resilient so that it can be primarily renewables-based. To this end, the gradual adaptation of network infrastructures, as well as their digitalisation and the deployment of tools providing

<sup>162</sup>[Energy Storage Strategy](#)

flexibility, such as storage, will be promoted 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 endowed with EUR 684 billion. And investment 3 “New business models in the Energy Transition” foresees EUR 156 billion to boost solutions that help to provide flexibility for the energy sector and increase innovation to address the challenges of the energy transition.

Given the boost to energy storage provided by tools such as the PRTR, or the progress made since the Strategy was approved, this updated NECP increases the energy storage sphymates installed in 2030, exceeding the forecasts of the Strategy. The following figure shows the comparison between the two documents.



**Figure A.2. Storage capacity in 2030 in the Strategy and the NECP**



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

## Biogás Route Sheet

In March 2022, the Spanish Government approved the **Biogás Roadmap 167**, which sets out a series of regulatory and sectoral measures, inter alia, for the deployment of this energy in Spain and provides for minimum production by 2030. This roadmap focuses on biogas produced by anaerobic digestion from disfinite residual raw materials from disfinite origins, prioritising its direct utilisation on the basis of technical, environmental and economic criteria.

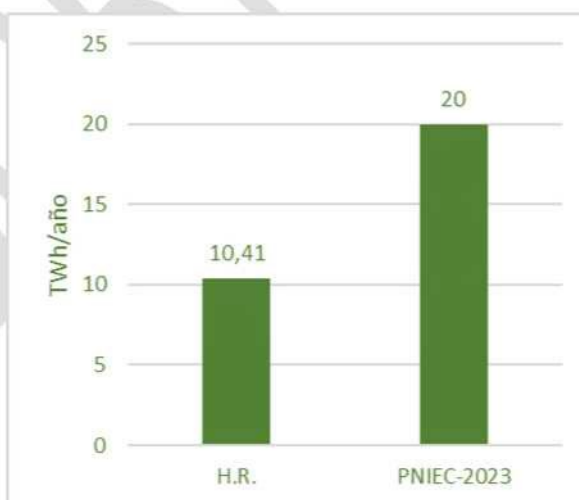
This Roadmap proposes to multiply by 3,8 the production of this gas up to 2030, exceeding 10.4 TWh. It is the tool to guide and encourage the deployment and development of this biofuel in Spain, given its capacity to integrate the circular economy into renewable energy generation.

Subsequently, the Communication from the European Commission (REPowerEU Plan) of 18 May 2022, with its objective of rapidly reducing the EU's dependence on Russian fossil fuels by accelerating the clean energy transition, highlighted the important role biomethane can play in this sense as a disruptive natural gas from fossil fuels and has set out an ambitious indicative objective of producing biomethane at 2030 of 35 bcm per year in the EU as a whole, accounting for approximately 8.5 % of annual natural gas demand in the EU.

As a result, and thanks to the reinforcement of the measures in this sense contained in the update of the NECP, the forecasts of the Roadmap are considerably exceeded, with the number of counts being doubled.

The following figure shows the comparison between the biogas production objective of the Roadmap for 2030 and the forecast of this NECP for the same year.

**Figure A.3. Biogas production 2030 in the Roadmap and the NECP**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

## 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 the Marine Wind and Marine Energy in Spain<sup>168</sup>.

This roadmap that enhances Spain's industrial leadership in renewable energy, building on the technological progress made in recent years with a view to generating stable, sustainable and quality jobs, sets a capacity of between 1 GW and 3 GW of floating wind in 2030, 40 % of the European target of having 7 GW installed in this renewable technology and is initially equipped to strengthen testing platforms and offer the best test beds for new technologies.

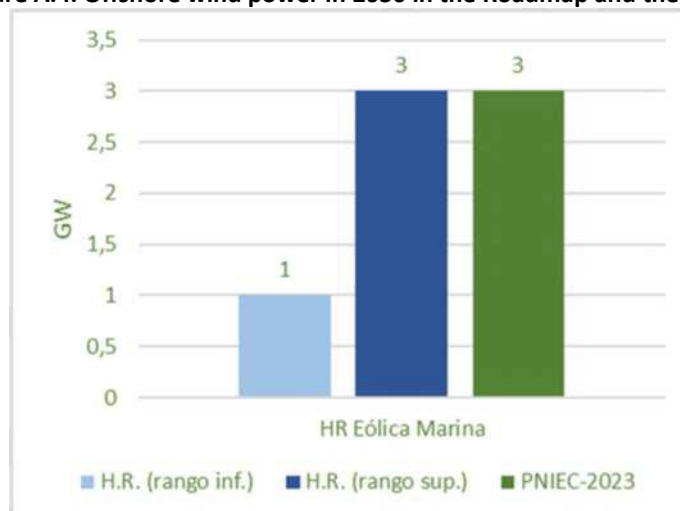
Within the PRTR, the PERTE for the shipbuilding industry has been developed, which supports the objectives of the introduction of this energy source.

<sup>167</sup>[Biogás Route Sheet](#)



The following figure shows a comparison between the installed capacity according to the Roadmap for 2030, which is between 1 and 3 GW, and the forecast of this PNIEC for the same year, which is at the upper limit of the range indicated.

**Figure A.4. Offshore wind power in 2030 in the Roadmap and the NECP**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

### The Road Map for Self-Consumption

The<sup>169</sup> Road Map for Self-Consumption, approved in 2021, sets out the range of supporting and promoting this type of policy. 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 demand from citizens, businesses and public administrations has facilitated faster than expected penetration so far. Since 2018, self-consumption in Spain has multiply, reaching a cumulative total in 2021 of between 2.500 MW and 2.750 MW 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 roadmap has as its main motivation to identify challenges and opportunities and set out measures to fulfil the sector’s development potential and sets out the following objectives:

- Establish the potential for self-consumption penetration by type of consumer.
- Establish the lines of action to promote renewable self-consumption, placing the citizen at the heart of the energy system, and activate its use as a key tool in the fight against energy poverty.
- Develop tools to promote their sharing.
- Facilitate the deployment of applications in areas such as industry or services in a context of economic recovery, as well as in the public sector.
- Develop self-consumption as a lever for rapid generation of activity and employment, both directly and through the effect on different 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 in the Palanca Polifónica 3. “Just and Inclusive Energy Transition”. In fact, the PRTR has dedicated its main aid instrument in the field of energy transition to self-consumption, with an envelope of over EUR 1.800 million. This push plan has been key, in times of unrest such as those associated with the COVID-19 crisis and Russia’s invasion of Ukraine, to sustain and accelerate the deployment of self-consumption in Spain.

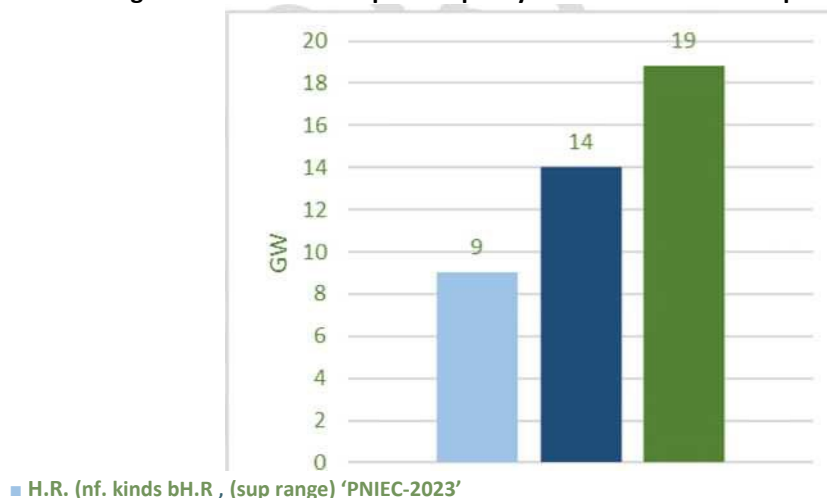
The following figure shows a comparison between the forecast of self-consumption power in the

<sup>168</sup>[roadmap for the development of the Marine Wind and Marine Energy in Spain](#)

<sup>169</sup>[road sheet for self-consumption](#)

roadmap for 2030 and that of this PNIEC for the same year, which far exceeds the value of the upper range indicated.

**Figure A.5. Self-consumption capacity in 2030 in the Roadmap and the NECP**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

## A.4 ENERGY SECURITY DIMENSION

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 today. For this reason, and considering that the domestic production of hydrocarbons is residual, the supply of this type of fuel is essential for the country's energy security, which is understood as security of supply.

In order to reduce the exposure to the risks that a reduction in the supply of these fuels could pose, two routes have been followed that are complementary to the other objectives of this Plan:

- Firstly, an increase in the country's energy efficiency will reduce overall energy demand, which will require less energy to meet it.
- Secondly, and in order to increase the effect of the above, the 2023 PNIEC Scenario provides for a significant substitution of fossil fuels by indigenous ones (almost all renewable energies).

These two effects can be seen in the previous sections detailing the primary and final energy consumption of the Spanish economy.

On the other hand, this section also analyses the external dependence of the electricity generation sector. This sector is also dependent on the consumption of hydrocarbons, albeit to a lesser extent than the rest of the economy.

### A.4.1 Current energy balance, domestic energy resources and import dependency

In the previous sections, we have presented the various primary sources that constitute the source of Spain's energy supply, as well as the breakdown and its projection in the future. On the basis of 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 reasons:

- More benign Climatology, leading to lower penetration of natural gas among domestic consumers and central heating.
- Increased importance of natural gas in electricity generation, which means that its presence in final energy is significantly lower than the share in primary energy.
- For petroleum products, their presence in the national energy mix is higher than the EU average. This can be explained by the following reasons:
  - Further development of road freight transport.
  - Important consumption for maritime transport versus domestic Member States.
  - High consumption for air transport due to the importance of the tourism sector.

The national production of hydrocarbons is almost testimonial, with the data for 2021 being as follows:

- **Domestic production of natural gas (2021):** 540 GWh (0.14 % of total needs). Domestic production is not only that of hydrocarbon deposits, but also the injection of biogas into the transport network.
- **Domestic crude oil production (2021):** 5,8 ktoe (0.01 % of total needs).

The main countries of origin for the different energy sources are:

- **Electricity** Spain has electricity interconnections with France, Portugal, Andorra and Morocco. The details of imports and exports with these countries can be found in the table below.

**Table A.27. Annual physical international exchanges by border**

Annual physical international exchanges per border (GWh)						
	Years	2010	2015	2017	2019	2021
<b>Entries</b>	Andorra	0	0	0	0	0
	France	1.983	9.131	15.564	12.813	11.909
	Portugal	3.189	5.811	8.190	4.700	4.822
	Morocco	34	14	8	1.208	688
	<b>Total</b>	5.206	14.956	23.763	18.721	17.418
<b>Going</b>	Andorra	264	264	233	208	225
	France	3.514	1.807	3.099	3.116	6.276
	Portugal	5.823	8.077	5.505	8.099	9.513
	Morocco	3.937	4.941	5.756	435	509
	<b>Total</b>	13.539	15.089	14.594	11.859	16.523
<b>Balance</b>	Andorra	— 264	— 264	— 233	— 208	— 225
	France	— 1.531	7.324	12.465	9.697	5.632
	Portugal	— 2.634	— 2.266	2.685	— 3.399	—
	Morocco	— 3.903	— 4.927	— 5.748	773	179
	<b>Total</b>	— 8.333	— 133	9.169	6.862	895

\* Positive value: importer balance; Negative value: export balance.

Source: Red Eléctrica de España

- **Natural gas:** in 2021, 45 % of imports were via pipelines, compared to 55 % in methane vessels, in the form of liquefied natural gas (LNG) injected into the grid after passing through regasification plants.

The breakdown by country of origin of imports of natural gas in 2021 was as follows:

- r Algeria (43 %)
- United States (15 %)
- r Nigeria (11 %)
- Russia (9 %)
- Qatar (6 %)
- Other (14 %)

In view of the above, a potential risk is the relative dependence on imports of natural gas from Algeria, which is offset by the high weight of imports using a methane vessel from a wide range of countries of origin.

- **Petroleum products:** as regards crude oil imports, the main countries of origin in 2021 were as follows:
  - r Nigeria (18 %)
  - Mexico (14 %)
  - r Libya (11 %)
  - Kazakhstan (8 %)
  - United States (7 %)
  - Other (42 %)

As can be seen, diversification in sources of oil origin is much higher than that of gas.

#### A.4.2 Estimates for the evolution of the energy balance, domestic energy resources and import dependency with existing policies and measures

The 2030 projection of the breakdown of primary energy by national production and imports is presented below.

**Table A.28. Evolution of the primary energy dependency ratio of the Scenario (ktoe)**

Origin of primary energy, PNIIEC 2023-2030 scenario (ktoe)				
Years	2019	2020	2025	2030
<b>National production</b>	<b>33.823</b>	<b>34.458</b>	<b>43.806</b>	<b>50.478</b>
	<b>27 %</b>	<b>31 %</b>	<b>39 %</b>	<b>49 %</b>
Coal	0	0	0	0
Petroleum products	40	28	147	148
Natural gas	116	42	49	49
Nuclear	15.218	15.174	15.209	10.189
Renewables	17.922	18.674	27.850	39.601
Non-renewable waste	526	540	550	490
<b>Net imported/exported</b>	<b>92.159</b>	<b>76.372</b>	<b>67.993</b>	<b>51.701</b>
	<b>73 %</b>	<b>69 %</b>	<b>61 %</b>	<b>51 %</b>
Coal	5.072	3.100	1.404	1.088
Petroleum products	56.122	45.661	47.078	36.985
Natural gas	30.781	27.874	20.329	17.958
Electricity	590	282	— 978	— 4.360
Renewables	— 406	— 545	159	29

<b>Total Primary Energy</b>	<b>125.981</b>	<b>110.830</b>	<b>111.799</b>	<b>102.178</b>
-----------------------------	----------------	----------------	----------------	----------------

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

Compared to the situation in 2019, where the coefficient of external energy dependency is 73 %, the PNIEC 2023-2030 scenario represents a reduction of 22 percentage points to 51 %. This will further reduce one of the most important structural weaknesses of the national energy system.

In addition, fossil fuel imports are reduced by an even higher percentage than energy dependency. This effect is achieved by combining the two effects discussed at the beginning of this section: reducing overall energy consumption through the use of energy efficiency, as well as replacing hydrocarbon consumption with indigenous fuels (especially renewables and largely due to increased electrification of the sectors).

Against this background, the trade balance is projected to improve substantially by 2030, subject to compliance with the policies and measures included in the plan. Specifically, there is a shift from a net import of 91.974 ktoe between coal, natural gas and oil in 2019 to 56.031 ktoe in 2030 (39 % reduction).

With regard to electricity, the increase in the installed capacity of renewable energy sources increases security of supply due to the use of indigenous sources and increased diversification of sources. In the PNIEC 2023-2030 scenario, 81 % of electricity produced from renewable sources is reached. As regards its 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's objectives of an interconnection capacity of at least 15 % of the installed capacity of each Member State. This point is discussed in more detail in section A.5.

### A.4.3 Cybersecurity

The definition of the cybersecurity objective is: *“ensure the safe use of communication and information networks and systems by strengthening capabilities to prevent, detect and respond to cyber-attacks by enhancing and taking specific measures to contribute to the promotion of a secure and trustworthy cyberspace.”*

According to the 2021 Annual National Security Report, most attacks result from the injection of harmful software, 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 cyber-attacks by ransomware caused 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, which included important changes 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.

A sector of strategic importance for national security is **critical infrastructure**. **The existence of legislation for the protection of critical infrastructure 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 concerning measures for a high common level of security of network and information systems of the Union (**NIS Directive**), in a rapid and simple manner, as 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, on the security of network and information systems**, developed in Royal Decree 43/2001 of 26 January 2007, transposed the above-

mentioned NIS Directive into Spanish law, which has provided a significant boost to the cybersecurity of essential energy services.

In addition to this legislative update, Spain adopted in April 2019 its **National Cybersecurity Strategy**, the function of which is to develop the forecasts of the 2017 National Security Strategy in the field of cybersecurity, and which replaced the previous one, approved in 2013. Subsequently, following the mandate issued by the National Security Council and developing the 2019 National Cybersecurity Strategy, the National Cybersecurity Plan was approved in March 2022. It should also be noted that, since 2015, Spain has had a National Energy Security **Strategy in place**. In view of the significant regulatory, technological and energy policy changes that have taken place in these years, it is expected to be updated shortly.

This strategy has boosted and strengthened public-private cooperation with the various energy operators, a task that has been coordinated by the Cyber Coordination Office (OCC) of the National Centre for Critical Infrastructure and Cybersecurity Protection (CNPIC). Similarly, the designated critical 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 the threats and challenges to critical infrastructure in the energy sector and in the nuclear industry, updating the information contained in those plans.

Finally, Spain has taken good note **of the Commission Recommendation** to the Member States on Cybersecurity in the Energy Sector of 3 April 2019 and 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 legacy and state-of-the-art technologies*).

## A.5 INTERNAL ENERGY MARKET

This dimension analyses the various components that make up the internal energy market. The importance of interconnectivity, energy transmission infrastructure and energy market integration is highlighted.

The two markets referred to in this point are electricity and gas markets. International exchanges on the electricity market are carried out through interconnections between countries. On the other hand, international trade in gas takes place via pipeline or through the use of vessels transporting liquefied natural gas. These international exchanges are essential for progress towards a unified European energy market.

### A.5.1 Interconnectivity

#### A.5.1.1 Interconnectivity of the electricity system

##### Current level of interconnection and main interconnections

Spain is currently electrically interconnected with Member States in Portugal and France, as well as with non-EU Andorra and Morocco.

The main characteristics of the interconnections with the different countries mentioned are as follows:

- 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 a direct current line and was put into service in October 2015 through the Eastern Pyrenees. It is of great importance, as it led to a doubling of electricity exchange capacity with this country, reaching a total of around 2.200-2.800 MW. It is also important for its influence on the quality and security of supply and the capacity to integrate renewable energy. Despite this latter 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 2021-2026 Electricity Transmission Network Development Plan provides for the construction or reinforcement of the following electricity links:

- Spain-France Interconnection for the Gulf of Bizkaia: Direct current submarine interconnection, with VSC technology almost 400 km long, with a transport capacity of 2x1.000 MW between the Gatica substation (near Bilbao) and Cubnezais substation (in the French Aquitaine Region), which was declared a Project of Common Interest (PCI) in 2013.
- Strengthening interconnection Spain-France (Gatica): Internal reinforcements associated with the future underwater interconnection between Spain and France over the Bay of Biscay: Repowering lines Gatica-Güeñes 400 kV, Gatica-Azpeitia 400 kV, Gatica – Amorebieta and Amorebieta-Itxaso 400 kV, new transformer at Gatica 400/220 kV
- Strengthening interconnection Spain – France (Hernani-Argia): Renewal with change of driver of the current section Hernani – French border 400 kV of line Hernani-Argia.

With these actions, the capacity to exchange will increase to 5.000. MW.

- The **interconnection with Portugal** consists of 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 account for a total capacity of between 2.200 and 3.000 MW.

In addition, 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 on the Adrall-Margineda 110 kV line.

The 2021-2026 Electricity Transmission 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 expected demands in this system from the Spanish system. This project consists of replacing the existing 110 kV line with a new double circuit of 220 kV from Adrall to the border with Andorra.

- Finally, **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 400 kV axis between Spain and Morocco consisting of a new submarine link between Puerto de la Cruz 400 kV and Beni Harchane 400 kV (Morocco) and 4 reactances of 50 MVAR in Puerto de la Cruz 400 kV and with a power of 700 MVA.

### Commercial capacity and electricity interconnection ratio

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, the distribution of electricity flows with the other interconnections and the location of generation centres and consumption points. For this reason, the sum of nominal capacities of lines crossing the border may be significantly lower than the total effective capacity.

The exchange capacity values of the Spanish mainland system with France, Portugal and Morocco for the period from 2013 to 2018 are shown below, according to the information provided by the system operator.

The values of interchange capacity available to the system operator are taken into account and two values are given, one with the 7th percentile<sup>163</sup> ( in line with ENTSO-E164) and the other with the maximum value (it makes it possible to see more clearly the increase in interconnection capacity in the same year in which it was improved).

---

The 70th percentile is the value commonly used to determine the trading capacity of the international interconnections. This percentile is used to leave some safety margin.

<sup>1</sup> ENTSO-E is *the European Network of Transmission System Operators for Electricity and* represents 43 technical system operators (TSOs) from 36 European countries.



**Table A.29. Commercial power exchange capacity**

Commercial electricity exchange capacity (MW)				
	NTC France – > Spain		NTC Portugal – > Spain	
	70th	Maximum value	70th percentile	Maximum value
<b>2013</b>	1.200	1.300	2.000	2.400
<b>2014</b>	1.200	1.300	2.100	2.900
<b>2015</b>	1.300	2.950	3.000	4.000
<b>2016</b>	2.750	3.500	2.800	3.900
<b>2017</b>	2.850	3.500	3.200	4.000
<b>2018<sup>165</sup></b>	2.900	3.600	3.500	4.000
<b>2019</b>	2.400	3.600	3.600	4.300
<b>2020</b>	2.913	3.746	3.240	4.545
<b>2021</b>	3.273	3.838	3.375	4.500
<b>2022</b>	3.145	3.838	3.240	4.590

Source: Red Eléctrica de España

The values of the interconnection ratios presented below have been calculated by applying the following additional considerations assumed by REE and based on those defined by ENTSO-E:

- For the calculation of the ratio of the Spanish mainland system, the borders with France and Portugal are taken into account. It is not considered to be Morocco because it is not bound by obligations and commitments at European level.
- For the calculation of the Iberian Peninsula ratio, only the border between France and Spain is taken into account.
- For the purpose 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 hourly values of *Net Transfer Capacity* (NTC) published in ESIOS166.
- The installed power value is the one corresponding to the beginning of the considered period.

**Table A.30. Evolution of installed electricity generation capacity Spain-Portugal**

Year	Installed capacity System peninsular <sup>167</sup> <sup>168</sup> (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 <sup>164</sup>	101.207	19.800
2019	103.205	20.161
2020	109.674	20.388
2021	112.816	19.552
2022	117.558	20.656

Source: Red Eléctrica de España

**Table A.31. Electricity interconnection ratio**

Electricity interconnection ratio				
Year		70th percentile	Highest	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: Commissioning of the Spain-France interconnection by 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 %	
2020	Spain	5.6 %	7.6 %	
	Iberian Peninsula	2.2 %	2.9 %	
2021	Spain	5.9 %	7.4 %	
	Iberian Peninsula	2.5 %	2.9 %	
2022 <sup>175</sup>	Spain	5.4 %	7.2 %	
	Iberian Peninsula	2.3 %	2.8 %	

Source: Red Eléctrica de España

### Projections of interconnection expansion requirements

<sup>167</sup>Includes the installed capacity in the Balearic system from the entry into service of the Peninsula – Mallorca link  
<sup>168</sup>Data until 15 December 2022

By agreement of the Council of Ministers of 22 March 2022, the document ‘Energy Planning’ was approved. Electricity Transmission Network Development Plan 2021-2026’, provided for in Article 4 of Law 24/2013 of 26 December on the Electricity Sector and published by the Resolution of the State Secretariat for Energy of 8 April 2022. This planning maintains and reinforces the approaches already present in the 2015-2020 planning set out in the document ‘Energy Planning. Electricity Transmission Network Development Plan 2015-2020’, approved by the Council of Ministers on 16 October 2015.

The 2021-2026 planning includes a new line of 400 kV by Galicia, called Fontefría-Vilafría, for strengthening the **interconnection between Spain and Portugal**. This new link, which is estimated to be operational in 2024, will increase the capacity to exchange 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. Specifically, once it is operational, it will enable up to 293 GWh/years to be integrated, which accounts for approximately 3 % of the current annual wind production in Galicia and will avoid the emission of 150 kilotonnes of CO<sub>2</sub>eq per year, as well as cost savings of up to EUR 22 million per year.

Furthermore, in order to improve **the interconnection between Spain and France**, the construction of a direct current underwater interconnection between Spain and France, using VSC technology and consisting of two symmetrical monopoles of 400 kV and 1 000 MW each, has been included in 2021-2026. It is a key element that will enable 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 increased flows to and from France, it is envisaged that the interconnection with France from Gatica and Hernani-Argia will be strengthened.

In addition to the infrastructure needed for the period 2021-2026, which would constitute binding planning, the 2021-2026 planning document identifies a series of actions which, although necessary and beneficial within the planning horizon by 2026, are not feasible for constructive or economic reasons.

The Annex to Horizon Actions post-2026 contains a list of these actions, which are proposed, **indicatively**, with an entry into service date after 2026:

- Spain-France interconnection between Navarre and Landes: New interconnection between Spain and France through the western Pyrenees between the Olza region in Spain and Cantegrit in France. This new interconnection will be in direct current, VSC technology and will consist of two symmetric monopoles of 1 000 MW each.
- Spain-France interconnection between Aragon and Pyrénées-Atlantiques: New interconnection between Spain and France by the Pyrenees central area between the Aragon region in Spain and Marsillon in France. This interconnection shall be in direct current, VSC technology and shall consist of two symmetric monopoles of 1 000 MW each.

The list of PCIs 2017 included these four projects affecting our country:

- Interconnection between Aquitaine (FR) and Basque Country (ES) (Bizkaia Gulf project).
- Interconnection between Aragon (ES) and Pyrénées Atlantiques (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).

From the third list of Projects of Community Interest in 2017, these projects will increase interconnection capacity with France to 8.000 MW.

Strengthening the international interconnections between Spain and France is essential in order to boost the energy transition of the Spanish mainland electricity system and to enable them to work together to achieve the objectives of integrating renewables and decarbonising the European Union, by making progress in integrating the Spanish mainland electricity system into the internal energy market.

The system operator continues to manage the projects of these future interconnections. In March 2018, the consultation and public participation phase of the interconnection through the Bay of Biscay, which is the most advanced, was closed. In 2022, the second phase of public information began, including the list of assets and rights affected.

Similarly, the 2021-2026 Planning includes a new interconnection between Spain and Andorra, via an overhead line at 220 kV, a double circuit between the Adrall substation and the border of Andorra.

The commissioning of the underwater interconnection with France through the Bay of Biscay will achieve an interconnection with the rest of Europe of 5.000 MW. Once transpyrenaic projects have been put into operation, this would reach 8.000 MW. It is important to note that, despite this significant increase in interconnection capacity, the European interconnection targets would not yet be met.

#### **A.5.1.2 Interconnectivity of the gas system: Current level of interconnection and main interconnections**

Spain currently has 6 physical interconnections, of which 4 with EU Member States and 2 with third countries.

##### **Interconnections with France**

There are two physical interconnections with France, through the municipalities of Irún (Guipúzcoa) and Larrau (Navarra). Both are managed as a single interconnection or virtual point (VIP Pyrenees). Transport capacities are as follows:

- France-Spain direction: 165 GWh/day firm + 65 GWh/day interruptible.
- Spain-France sense: 225 GWh/day.

During 2017, net imports via this interconnection were 43 TWh, which means a daily net flow of 121 GWh/day in the North-South direction, albeit with marked seasonality. Therefore, the usual flow is France-Spain, although it can sometimes be reversed.

It should be recalled that the interconnection capacity of Spain and, as a whole, of the Iberian Peninsula is among the lowest in the EU. During 2017, peak demand was recorded on 5 December at 1.772 GWh/day. On that specific day, firm interconnection capacity with France could contribute only 9 % of demand, which could amount to up to 13 % taking account of interruptible capacity.

##### **Interconnections with Portugal**

There are two physical interconnections with Portugal, through the municipalities of Badajoz and Tuy (Pontevedra). Like the interconnection with France, both are managed as a single interconnection or virtual point (Iberian VIP). Transport capacities are as follows:

- Portugal-Spain direction: 80 GWh/day.
- Spain-Portugal sense: 144 GWh/day.

During 2017, the net export via this interconnection was 30 TWh, resulting in a daily net flow of 82 GWh/day.

#### **Interconnections with Algeria**

There are two physical interconnections with Algeria, both of which are unidirectional in the import direction:

- The Magreb-Europe pipeline, which passes through Morocco and enters Spain through the municipality of Tarifa (Cádiz), with a transport capacity of 444 GWh/day. During 2017, imports via this interconnection were 86 TWh, resulting in a daily net flow of 237 GWh/day.
- The Medgaz pipeline, which enters Spain through 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 were 75 TWh, resulting in a daily net flow of 205 GWh/day.

## **A.5.2 Energy transmission infrastructure**

### **A.5.2.1 Electricity transmission infrastructure**

#### **Key characteristics of existing electricity transmission infrastructure**

According to the information provided by REE, the total circuit length of the national transport network on 31 December 2022 is 45.101 km. Also, 6.333 positions are available in substations. For its part, the installed processing capacity amounts to a national total of 94.221 MVA.

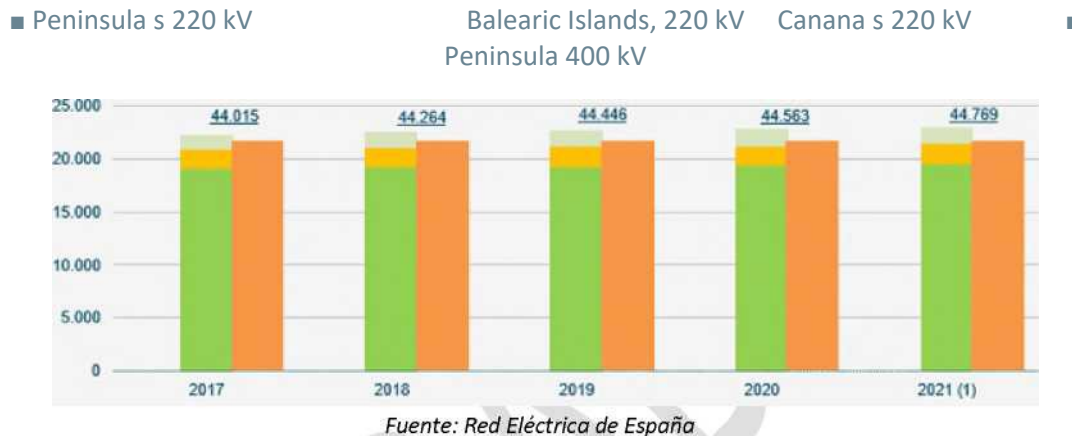
The breakdown of the lines by voltage level and considering their distribution between the mainland and the island systems or non-peninsular territories is presented below.

**Table A.32. Transmission system installations in Spain**

	400 kV		≤ 220 kV		Total
	Peninsula	Peninsula	Balearic Islands	Canary Islands	
Total lines (km)	21.768	19.493	1.929	1.578	44.769
Airlines (km)	<b>21.651</b>	<b>18.702</b>	<b>1.141</b>	<b>1.237</b>	<b>42.731</b>
Submarine cable (km)	29	236	582	30	877
Underground cable (km)	88	556	206	311	1.161
Transformation (MVA)	84.790	1.363	3.838	3.880	93.871

Provisional data pending ongoing audit.

Source: Space Power Networka169

**Figure A.6. Evolution of the length of the transport network****Table A.33. Evolution of the transmission network of 400 and ≤ 220 kV (circuit km)**

1 year	400 kV	Al. 220 kV	9 year	400 kV	Al. 220 kV
1982	8 975	14.466	2002	16.068	16 398
1963	9 563	14.491	2003	16.599	16.456
1984	9 998	14.598	2004	16.847	16.570
1985	10.781	14.652	2005	16.853	16.679
1986	10.978	14.746	2006	17 059	16.617
1967	11.147	14.849	2007	17.197	16.877
1988	12.194	14.938	2008	17.772	17.199
1989	12.533	14.964	2009	18 063	17.332
1990	12.636	15.035	2010	18.799	17.481
1991	12 983	15.109	2011	19 678	16 082
1992	13 222	15.356	2012	20 116	18.450
1993	13,611	15.442	2013	20.646	18.724
1994	13 737	15.586	2014	21 100	18.863
1995	13.970	15.629	2015	21.191	19.003
1996	14 084	15.734	2016	21 626	19 091
1997	14.244	15.776	2017	21.735	19.116
1998	14.538	15.876	2018	21 737	19.192
1999	14.536	15.975	2019	21.748	19.276
2000	14 918	16.078	2020	21 764	19.309
2001	15.366	16.116	2021 **)	21.768	19.493

(1) Data would be provided to them pending ongoing audits.

Source: Red Eléctrica de España

### A.5.2.2 Gas transmission infrastructure

#### Key features of existing gas transmission infrastructure

Spain has a gas transmission network with sufficient capacity to meet the needs of supply and delivery to the distribution network in the medium term.

Figure A.7. Gas infrastructure map



Source: Sedigas

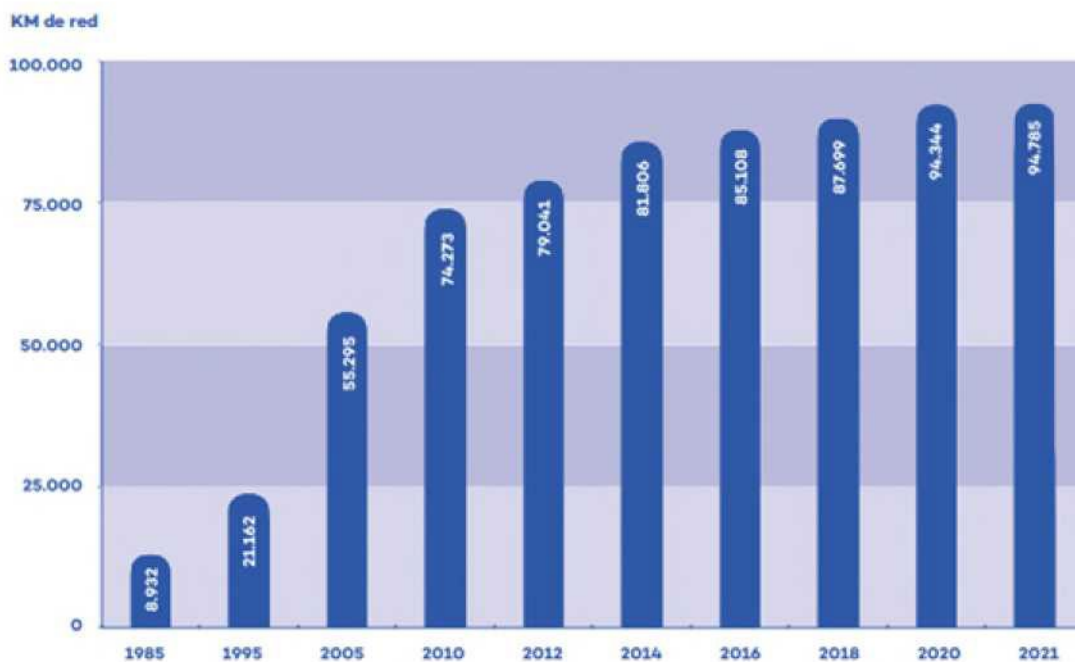
#### Pipeline network

The following definitions have been laid down in Law 34/1998 on the hydrocarbons sector:

- Pipelines for the primary transport of high pressure natural gas: those with a maximum design pressure equal to or greater than 60 bar.
- Secondary transmission pipelines: those with a maximum design pressure of 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 Core Network pipeline or secondary transmission pipeline.

At the end of 2021, there were 11.369 km of primary transmission pipelines, 1.992 km of secondary transmission pipelines and 80.915 km of distribution pipelines, totalling 94.785 km of transmission and distribution network.

Figure A.8. Evolution of the length of natural gas transmission and distribution networks (km)



Fuente: Sedigas

As regards the transmission system, only two secondary transmission pipelines were launched during the financial year 2017:

- The Yeles-Seseña pipeline, with a maximum working pressure of 59 bar, a length of 9 km and a diameter 8'
- The Villacarrillo-Villanueva del Arzobispo pipeline with a maximum pressure of 49.5 bar, a length of 12 km and a diameter of 8'.

Finally, the pipeline network has nineteen compression stations that allow gas to be transported from the various entry points of the system to their final destinations, as shown in Figure A.7.

### Regasification plants

At the end of 2021, the gas system had 6 operational regasification plants, with the following aggregated characteristics:

- Regasification capacity: 1.900 GWh/day.  
The average production of the plants during 2021 was 522 GWh/day.
- LNG storage capacity: 3,3 million m<sup>3</sup> LNG (22.5 TWh).  
The mean filling level of the tanks during 2021 was 11.7 TWh.

The following table shows the operational regasification plants and their technical characteristics:

**Table A.34. Regasification plants**

Regasification plant	Maximum vaporisation capacity	LNG storage		Carrying capacity of		Berths
		Nm <sup>3</sup> /h	No of tanks	m <sup>3</sup> LNG	GWh/day No of berths	
Barcelona	1.950.000	6	760.000	15	2	266.000
Huelva	1.350.000	5	619.500	15	1	180.000
Cartagena	1350.000	5	587.000	15	2	266.000
Bilbao	800.000	3	450.000	5	1	270.000
Sagunto	1.000.000	4	600.000	105	1	266.000



Mugardos	412.800	2	300.000	105	1	266.000
<b>Total</b>	<b>6.862.800</b>	<b>25</b>	<b>3.316.500</b>	<b>71</b>	<b>8</b>	<b>until 270.000</b>

Source: Enagás GTS

### Underground storage

The gas system has 4 underground storage facilities in 2023, operated as a single storage for the purposes of commercial procurement, with the following characteristics:

- Useful storage capacity: 34.2 TWh, discounting the cushion gas.
- Stocks ranged in 2022 from 20 TWh (February) to 34 TWh (November), of which 20 TWh corresponded to minimum strategic 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 recent years is reflected below.

Table A.35. Components of the final average electricity price. Mainland demand. Prices in central bars.

Artos	Day-ahead market	Intraday	Balancing markets	Technical restrictions	Capacity payments	Interrump.	Total (nominal prices)	Total (actual prices)
2007	41,08	0.00	0.94	1.34	3.90	0.00	47.26	56.97
2008	65,91	0.00	0.94	1,66	1.07	0.00	69.57	80.57
2009	38.17	— 0,02	0.85	1.85	2.49	0.00	43,33	50.33
2010	38.46	— 0.02	1.21	2.55	3.49	0.00	45.68	52.13
2011	50.97	— 0.06	1.12	2.09	6.10	0.00	60.22	66.58
2012	48.84	— 0.04	2.04	2.58	6.09	0.00	59.52	64.23
2013	46.23	— 0.06	2.30	3.29	6.04	0.00	57,80	61.50
2014	43.46	• 0,04	1.93	3.76	5,93	0.00	55,05	58.66
2015	51.67	0.00	1.29	2.98	5.02	1.89	62,85	67.31
2016	40.63	0.00	0,91	2.19	2,76	1.93	48,42	51.95
2017	53.41	0.00	0.82	1.54	2.72	2.06	60,55	63.71
2018	58.12	— 0.03	0,80	1.53	2.70	1,23	64,35	66.59
2019	48 58	— 0.02	0.45	1.00	2.64	0,74	53,41	54.89
2020	35,21	— 0.02	0.42	2.12	2.65	0,02	40,40	41.65
2021	113,15	— 0.02	1.27	3.00	1.31	0.00	118.71	118.71

Source: Spanish National Commission on Markets and Competition

### A.5.3.2 Gas markets and prices

#### Current situation on the gas market.

##### Supplies

In the supply structure and gas flows at entry points, the increasing importance of LNG supplies (55 % in 2021 and 71 % in 2022, compared to 47 % in 2017) and the reduction in the weight of Algeria as the main supplier country (43 % in 2021 and 27 % in 2022, compared to a share of 48 % in 2017) are highlighted.

The customs records published by the Tax Agency and analysed by the CNMC in its Report on Supervision of the Natural Gas Market in Spain show for 2021 the following facts:

- The average cost of supplies was EUR 24,79/MWh, compared to EUR 13,75/MWh in 2020, highly influenced by the COVID-19 pandemic.
- 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 traders, mainly with Algeria, is indexed to the price of oil. This explains the price increase in 2021, which was particularly relevant in the last four months.

### **Wholesale market**

It is defined as the market consisting of the transactions carried out by traders in the Spanish gas system, whether they are carried out at regasification plants, in underground storage (AVB) or at the Virtual Balance Point (PVB) of the pipeline network.

The Spanish wholesale market is characterised by:

- The high share of the over-the-counter market, which accounted for 93 % of transactions in 2021.
- Lower trading activity than in other Member States due to reduced interconnection capacity with France and therefore reduced arbitrage opportunities.
- The importance of LNG transactions in the tanks of the regasification plants, for which since April 2020 transactions at the plants have been unified at a so-called virtual point (TVB).
- A market concentration in a small number of companies, which has been decreasing in recent years, with a share of 21.3 % for the top 3 players in 2021.

The main figures characterising the wholesale gas market in Spain are as follows:

- The total volume traded on the over-the-counter wholesale market in 2021 was 944 TWh, 250 % of national demand, with most of these volumes traded on the TVB, followed by PVB.
- For its part, the total volume traded on the organised wholesale market (MIBGAS) in 2021 totalled 69 TWh, or 18 % of national demand, and it should be noted that MIBGAS deals with products delivered to PVB, AVB and TVB.

As regards the marginal price on the wholesale market, its dynamics can be considered to be influenced by the following prices:

- LNG price in the tanks of the regasification plants, incorporating the regasification toll, considering that the price of LNG in tanks depends in turn on the evolution of the price of the raw material, the cost of transport by methane vessel and the unloading toll.
- Price of flexible volumes of Algerian gas driven by the Maghreb and Medgaz pipelines, indexed to oil.
- Price of gas in the southern French balancing area (hub TRS), incorporating the charges for leaving the French network and entering the Spanish network.

The price on the wholesale market is therefore particularly sensitive to variations in the price of LNG, as well as to the price evolution of the main hubs in the EU, even if this influence is cushioned by the low 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, that 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, started trading spot products with delivery to the PVB. In the period up to December 2021, there has been a significant increase in the number of participants, volume and number of offers and transactions:

**Table A.36. Organised gas market operations, MIBGAS**

Transactions in MIBGAS			
SETTING	2019	2020	2021
Number of registered agents	105	144	169
Average number of active agents per day	56	76	102
Negotiated volume (GWh)	48.270	39.780	68.793
<i>Churn rate</i> (turnover/domestic demand)	12.5 %	11.5 %	18.9 %
Intraday product volume (D) (GWh)	16.540	14.891	23.645
Daily product volume (D + 1) (GWh)	12.758	10.208	19.231
Daily product volume (M + 1) (GWh)	9.258	4.214	15.752

Source: *Organised Major Market of Gas*<sup>177</sup>

As can be seen from the table above, continued growth in the number of agents, both registered and active, persists. In addition, the volume of gas traded on the market continues to increase, with a significant increase in its weight in relation to domestic demand.

Furthermore, the monitoring of the Gas Target Model metrics carried out by the market operator MIBGAS in its 2021 Annual Report shows the improvement of the functioning of the market on the basis of metrics defined by ACER (market depth, price sensitivity of offers and sale, number of transactions and difference between bid and sale prices).

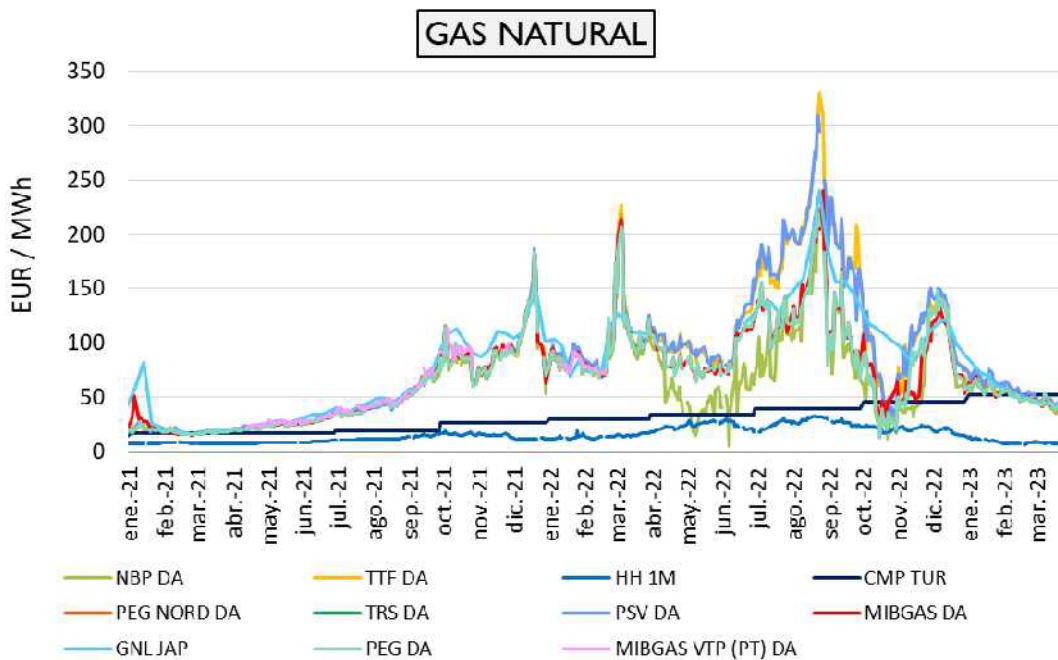
The results obtained on these metrics make it possible to compare the current situation of MIBGAS with that of the main European gas hubs, with a marked improvement in the liquidity of the trading platform.

Focusing on prices, the following graph shows the trend from gas prices.

Annual data during the reference year.

177

**Figure A.9. Price evolution of gas markets**



2021 was a turning point in the gas sector, after the post-pandemic recovery, moving from a market with oversupply to a non-surplus market. The situation in Europe was marked by gas reserves which were below average levels throughout the year, increased gas demand in the face of economic recovery and a gradual decline in Russian supply.

As a result, there was a general increase in prices, particularly significant at the end of the year, amid 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, the Russian invasion shaken the markets, followed by a reduction in the flow of Russian gas into Europe, increasing the tension in European gas storages. This led to a decoupling between the markets where LNG was most influenced, such as MIBGAS, as opposed to those where Russian pipeline supply was predominant.

As a result, 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 first quarter of 2023 in Europe has been marked by the drop in demand and high levels of storage after a warmer winter than usual, as well as improvements in the LNG supply chain, allowing the main European markets to return to similar levels and between EUR 40-60/MWh.

**(EN) retail market**

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 as follows:

- Low proportion of supply points in relation to the population, with low penetration of the household segment due to weather conditions.
- High business concentration, with a high market share of the incumbent operator maintaining most of the distribution network.
- Final selling price of gas higher than in the EU average.

The main indicators of this market in 2021 are as follows:

- Number of clients: 8,0 million.
- Number of marketers with sales to final customers: 129 marketers.

Market shares based on sales and number of customers in 2021 are shown in the following tables:

**Table A.37. Shares of gas retail market operators – 1**

Retail market participants' shares	
Business group	Share of sales volume
Naturgy	27.3 %
Endesa	16.2 %
Repsol	10.1 %
Iberdrola	8.3 %
Cepsa	5.6 %
Axpo	4.9 %

*Source: Spanish National Commission on Markets and Competition*

The value of the Herfindahl-Hirschman 170 (HHI) index was 1.281, reflecting a low concentration in terms of natural gas sales.

In recent years, business concentration on the basis of sales has been decreasing, with Naturgy being the most affected group of companies, from 39.6 % in 2017 to 27 % in 2021. In addition, there has also been a decline in the share of the five largest traders, which have evolved from an aggregate share of 76 % in 2017 to 72 % in 2021, as a result of the growth of small traders and corporate operations in the sector.

**Table A.38. Shares of gas retail market operators – 2**

Retail market participants' shares	
Business group	Share of number of customers
Naturgy	46.2 %
Endesa	19.4 %
Iberdrola	14.4 %
TotalEnergies	11.4 %
Repsol	3.1 %

Source: Spanish National Commission on Markets and Competition

The value of the Herfindahl-Hirschman 171 (HHI) index was 2.856, reflecting a higher concentration in terms of customers.

- Switching rate: it stood at 13.0 % in 2021, continuing an increasing trend from 7.8 % in 2019.
- Number of default-defaults: in 2020, 17.766 (2,22 cuts per 1.000 customers) were halved compared to 2019, as the pandemic restricted the supply cut in the usual dwelling.

In addition, two basic tariff types coexist in the retail market:

- The Last Appeal Tariff (TUR), a regulated tariff available to consumers with consumption below or equal to 50.000 kWh/year, at the end of 2021 represents 19 % of total customers and 2 % of sales volume.
- The free market with 81 % of total customers and 98 % of sales volume.

The annual cost of gas supply to a customer entitled to benefit from TUR was as follows at the end of 2021:

- TUR1 (consumption below 5.000 kWh/year): EUR 214/year for the average consumer (2.380 kWh/year).
- TUR2 (consumption between 5.000-15.000 kWh/year): EUR 533/year for the average consumer (7.276 kWh/year).
- TUR3 (consumption between 15.000-50.000 kWh/year): EUR 1.251/year for the average consumer (18.740 kWh/year).

The graph below shows a comparison of gas prices for a household consumer (in the range of 2.500 to 5.000 kWh/year) made by the European Commission.

It shows that the price in Spain is the eighth most expensive in the EU, due to both higher raw material prices and higher VAT than other European countries.

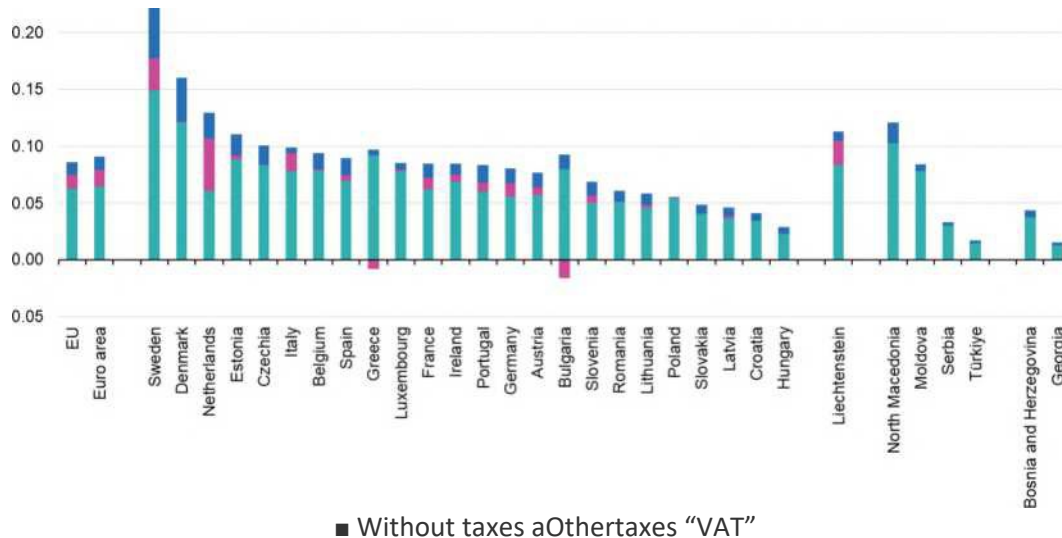
**Figure A.10. Price of natural gas for a household consumer in the EU and other European countries in the first half of 2022 (EUR/kWh)**

**Natural gas prices for household consumers, first half 2022**  
(EUR per kWh)

179  
0 25

---

Index used to analyse the level of concentration in a market. At the highest level, the highest degree of concentration. A market is usually regarded as a non-concentrated market with values below 1.000, between 1.000 and 1.800 as moderately concentrated, and with a value of more than 1.800 as concentrated.



■ Without taxes aOthertaxes "VAT"

Source: Energy prices and costs in Europe, Eurostat, 2023

### Projections of price developments with current policies and measures

The price of gas in Spain over the projection horizon of the Plan corresponds to the international price assumptions for this fuel recommended by the European Commission.

### A.5.4 Main components of electricity and gas prices

As far as electricity is concerned, the final electricity consumer bill currently incorporates:

**The cost of energy**, which includes:

- Cost in day-ahead, intraday and balancing services.
- The cost of capacity payments.
- The cost of the interruptibility demand management service on the mainland.
- The costs of remuneration to market and system operators.

**Access charges** to cover the costs of the system, which currently include both access charges through which the cost of transmission and distribution networks is remunerated.

Electricity system**charges**, covering the following items:

- The specific remuneration scheme for renewables, cogeneration and waste.
- The additional cost of generation in electricity systems in non-mainland territories.
- The allocation of the fund for the financing of the General Radioactive Waste Plan for Part 2 of the nuclear fuel cycle
- The remuneration of the regulator.
- The annuity of the tariff deficit.
- The balance between revenues and remuneration established for the implementation of capacity mechanisms

**The marketing margin applied to energy or power billing.**

**The cost of renting measuring equipment.**

**Electricity taxes and VAT:**



- The standard rate of electricity tax (EEI) is 5.1127 %, which applies to energy and power billing. In order to cope with the price increase, during the second half of 2021 the Spanish Government reduced the EEI from 5.1127 % to 0.5 %, the minimum allowed by the European Commission.
- VAT is 21 % on the total invoice, including the cost of renting out 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 VAT for households, bringing the tax rate for households to 5 %.

As regards natural gas, Spain submits to Eurostat every six months the average price of domestic and industrial natural gas by consumption band. This information is obtained from the national sales weighted average of the prices sent by the traders of natural gas to MITECO.

The price is currently broken down into price with taxes, price excluding VAT and price excluding tax. However, work is ongoing on a further breakdown into three components: energy and supply, networks, and taxes, charges and fees.

The average prices sent to Eurostat for the first half of 2022 are as follows:

**Table A.39. Average price of domestic and industrial natural gas by consumption band**

Average price of domestic and industrial natural gas by consumer bands First semester 2022					
Household consumption band	Annual consumption (GJ)		Price excluding taxes	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)
D1	≥ 20	Al. 20	0,0841	0,0995	0,1203
D2		Al. 200	0,0607	0,0742	0,0897
D3		≥ 200	0,0656	0,0778	0,0941
Non-household consumption	Annual consumption (GJ)		Price excluding taxes	Price excluding VAT (EUR/kWh)	Price with taxes (EUR/kWh)
I1	≥ 1.000	Al. 1.000	0,0779	0,0894	0,1081
I2		Al. 10.000	0,0634	0,0736	0,0890
I3	≥ 10.000	Al. 100.000	0,0684	0,0729	0,0882
I4	≥ 100.000	Al. 1000.000	0,0744	0,0771	0,0933
I5	≥ 1000.000	Al. 4.000.000	0,0736	0,0761	0,0921
I6	≥ 4.000.000		0,0713	0,0737	0,0892

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

## A.5.5. Nuclear energy in Spain

### A.5.5.1 End of orderly and staggered operation of the nuclear park

The companies owning the nuclear park and the Empresa Nacional de Residuos Radiacentes, S.A., S.M.E. (Enresa), a public company responsible for managing the aforementioned waste, as well as for the dismantling and decommissioning of the nuclear installations, have unanimously agreed on a schedule for the orderly and phased cessation of operation of the seven nuclear reactors that remain active.

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 staggered cessation of operation of the nuclear park is compatible with the full guarantee of electricity supply, as demonstrated in the reports of Red Eléctrica de España (see Annex D.2).

It is also compatible with the key objective of this NECP of achieving at least 20 % emission mitigation in 2030 compared to 1990. If it had been decided to cease operating the reactors once they had reached the age of 40, the entire nuclear park would have ceased operation before 2030. According to the sensitivity analyses carried out using the TIMES-Sinergia model, in these circumstances it would not have been possible to achieve the above-mentioned 20 % emission mitigation target for 1990 in an efficient way.

Furthermore, as a result of the above agreement between the parties, there is a sufficiently long period of time for the process to be carried out under suitable technical conditions and the availability of human equipment. Finally, it should be noted that the agreed time frame will make it possible to properly capitalise on the existing fund (Enresa) for the dismantling 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 management of the supply of enriched uranium to all Spanish nuclear power plants. This company acts as a central purchasing body for all plants, for which it purchases the uranium concentrate on the international markets on the basis of price, diversification and security of supply criteria, and contracts conversion and enrichment services from different suppliers abroad.

Notwithstanding the above, it should be noted that the *European Supply Agency* (ESA) is an institution established by the Euratom Treaty for the purpose of establishing a common raw material supply policy, which supervises all contracts for the supply of uranium and services related to the supply of nuclear fuel established by plant operators in the EU.

#### **A.5.5.3 General Radioactive Waste Plan**

Article 38a of Law 25/1964 of 29 April 2003 on nuclear energy (inserted by the ninth final provision of Law 11/2009 of 26 October 2007 regulating the

Anónimas Cotizadas de Inversiones en el Mercado Inmobiliarios), that the management of radioactive waste and spent fuel and the dismantling and decommissioning of nuclear installations constitutes an essential public service reserved to the State, with Enresa being entrusted with the management of that public service, in accordance with the General Radioactive Waste Plan (GRRP), in which the Government establishes its policy on radioactive waste management and decommissioning of nuclear installations.

The GRWP sets out the strategies, actions needed and technical solutions to be developed in the short, medium and long term, aimed at the proper management of radioactive waste, the decommissioning and decommissioning of nuclear and radioactive facilities and other related activities, including the economic and financial forecasts for carrying them out. The 6th GRWP, currently in force, was adopted in June 2006.

In March 2020, the 7th GRWP started to be processed, with Enresa submitting a proposal to MITECO and launching its Strategic Environmental Assessment. Following the completion of the public information and consultation procedures required by this Strategic Environmental Assessment, and having obtained the reports required by Article 38a of Law 25/1964, a draft of the 7th GRWP was prepared in February 2023, which was submitted to the State Secretariat for the Environment for the issuance of the Strategic Environmental Declaration. It will then be

submitted for approval by the Council of Ministers and submitted to Parliament, as provided for in Law 25/1964.

Likewise, the 7th GRWP will be submitted to the European Commission, in accordance with the provisions of Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

This draft of the 7th GRWP was drawn up on the basis of the PNIEC 2021-2030, which sets out forecasts for the development of the contribution of nuclear energy to the energy mix, with a timetable for the orderly cessation of operation of nuclear power plants between 2027 and 2035.

With regard to the financing of the management of radioactive waste and the decommissioning of nuclear installations, the sixth additional provision of Law 54/1997 of 27 November 1997 on the electricity sector, declared in force by Law 24/2013, established, on the basis of the amendment made by Law 11/2009 of 29 October, that this public service will be financed through a system of fees 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, introduced 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 be in the legal nature of a tax, but to be regarded as a financial service of a non-fiscal nature.

This financing system is based on the ‘polluter pays’ principle and is based on the aforementioned public financial contributions paid by radioactive waste generators and fed into the so-called ‘Fund for the financing of activities of the GRWP’, in accordance with the sixth additional provision of Law 54/1997 of 27 November 2003 on the electricity sector.

Under that sixth additional provision, the tax rates and tax elements for determining the amount of those public financial benefits may be reviewed by the Government by means of a Royal Decree, on the basis of an updated economic and financial report of the cost of the activities concerned.

#### **A.5.6 Description of energy subsidies (including fossil fuels)**

In Spain, the consumption of energy products of fossil origin is subject to the Hydrocarbons Tax and the Special Tax on Coal, which are governed by Law 38/1992 of 28 December 1992 on excise duties (BOE of 29 December 1992), hereinafter referred to as ‘LIE’, and by the Excise Duty Regulation, approved by Royal Decree 1165/1995 of 7 July 2003 (Official State Gazette of 28 July). In both cases they are taxes harmonised at European Union level by virtue of Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (OJ EU L 283 of 31 October), which already incorporates environmental protection requirements.

In both taxes, in addition to the natural purpose of collection, an environmental purpose is pursued by incorporating in the price of these products the social costs arising from their consumption which are not reflected in the market price. In this way, the use of taxes as an instrument of economic policy is a prototypical example, in accordance with the second subparagraph of Article 2(1) of General Tax Law 58/2003 of 17 December 2003 (Official State Gazette of 18 December 2003): ‘Taxes, in addition to being a means of obtaining the resources necessary to sustain public expenditure, may serve as instruments of general economic policy and serve the realisation of the principles and aims set out in the Constitution.’

**a) Tax subsidies**

Spain applies certain subsidies to the use of energy products as heating fuels. The oil tax paid for the use of diesel in agriculture and livestock farming is partially reimbursed, as is the case for commercial use such as the transport of goods, passengers and taxis subject to certain limits. The exemptions from that tax are governed by Articles 9 and 51 of Law 38/1992 of 28 December on excise duties. The reduced tax rates set out in Article 50 of that Law are also applied, differentiating according to use. In particular, the following reduced rates for hydrocarbon uses are provided for:

- Gas oils used as motor fuels in the vehicles referred to in Article 54 (2) of Law 38/1992 (stationary engines, special purpose vehicles, agricultural vehicles) and, in general, as fuel (heating).
- LPG for use other than as fuel.
- Natural gas intended for use other than as fuel, as well as natural gas intended for use as fuel in stationary engines.
- Natural gas intended for professional use provided that it is not used in cogeneration processes and direct or indirect electricity generation.
- Kerosene for use other than as fuel.

**b) Measures to eliminate dependence on fossil fuels and their subsidies**

Within the framework established by Law 7/2021 of 20 May on climate change and energy transition, the replacement of fossil fuels is being addressed in order to meet the emission reduction targets laid down in the international treaties and in EU legislation by 2030 and to achieve climate neutrality by 2050, as soon as possible.

Title III of this law deals with measures related to the energy transition and fuels. Firstly, no new exploration authorisations, research permits and hydrocarbon exploitation concessions will be granted throughout the national territory, including the territorial sea, the exclusive economic zone and the continental shelf. Secondly, it is necessary to start a process that gradually ensures coherence between public support or incentives and climate change mitigation objectives. As a general rule in the law, the application of new tax benefits to energy products of fossil origin must be duly justified on grounds of social, economic interest or in the absence of technological alternatives.

Finally, provisions are introduced that promote renewable gases, including biogas, biomethane, hydrogen and other alternative fuels. Thus, it introduces into the law, on the one hand, that the government will promote, through the approval of specific plans, the penetration of these fuels and, on the other hand, a provision to reduce specific emissions in the aviation, maritime and heavy-duty road transport sector through the integration of renewable energies and the setting of supply targets for biofuels and other renewable fuels of non-biological origin. In order to avoid the use of biofuels that have a negative impact on the environment, compliance with the sustainability and air quality protection criteria laid down in Community legislation is required.

Another avenue to phase out fossil fuel subsidies is support for the promotion of renewables. Among others:

- Existence of a specific remuneration scheme ensuring a reasonable return on renewable energy, cogeneration and waste technologies.
- Various support schemes for the promotion of renewable energy sources.

- Aid for self-consumption
- Support to end uses: sustainable mobility, energy efficiency measures in industrial use and in the residential sector, in particular with regard to energy renovation

Some of these aid lines are currently included in the Recovery, Transformation and Resilience Plan approved for Spain and in its strategic projects, in particular the ERHA Support Programme for Renewable Energy, Green Hydrogen and Storage. They are granted by the Ministry for Energy Transition and the Demographic Challenge and are organised through the Institute for Energy Diversification and Saving (IDAE).

Table A.40. Energy subsidies 2020-21

Category	Description	Legal basis in 2019	Similar non-reduced rate	Trees	Quantification of aid *	Termination plans
<b>Energy Grants 2019 – Prosecutors</b>						
<b>Reduced tax rates</b>	Reduced rate of tax on petrol used as motor fuel in vehicles referred to in Article 54.2 (agriculture)	Law 38/1992 on Excise Duties Article 50	0,379	0,09671	EUR 0,28229/l	
	Reduced rate of fuel (heating)	Law 38/1992 on excise duties Art. 50	0,379	0,09671	EUR 0,28229/l	
	LPG for use other than as fuel	Law 38/1992 on Excise Duties Article 50	57,47	15	EUR 42,47/t	
	Natural gas for use other than as fuel, as well as natural gas intended for use as fuel in stationary engines	Law 38/1992 on Excise Duties Article 50	1,15	0,65	EUR 0,5/GJ	
	Natural gas intended for professional use provided that it is not used in cogeneration processes and direct or indirect electricity generation	Law 38/1992 on Excise Duties Article 50	1,15	0,15	EUR 1/GJ	
	Kerosene for non-fuel uses	Law 38/1992 on Excise Duties Article 50	0,378	0,07871	EUR 0,29929/l	
	Biodiesel for use as fuel for the purposes provided for in Article 54 (agriculture and livestock farming) and in general as fuel	Law 38/1992 on Excise Duties Article 50	0,379	0,09671	EUR 0,28229/l	
	Biomethanol for use as fuel	Law 38/1992 on Excise Duties Article 50	0,379	0,09671	EUR 0,28229/l	
<b>Exemptions and refunds</b>	Exemption from excise duty for energy products supplied for use as fuel for air navigation other than private pleasure flying	Law 38/1992 on excise duties Art. 9			The whole amount of the IEH (kerosene: EUR 0,378/l)	
	Exemption from excise duty on mineral oils for use as fuel in rail transport, construction, modification, testing and maintenance of aircraft and vessels, dredging of waterways and ports, injection into blast furnaces for chemical reduction purposes, added to coal used as main fuel	Law 38/1992 on Excise Duties Article 51			All the amount of the IEH (fuel function)	
	Exemption from excise duty on the manufacture and importation of mineral oils intended for non-recreational aviation and maritime navigation, electricity or cogeneration production in power plants, manufacture or import of biofuels or biofuels for research and other purposes	Law 38/1992 on Excise Duties Article 51			All the amount of the IEH (fuel function)	

Category	Description	Legal basis in 2019	Similar non-reduced rate	Trees	Quantification of aid *	Termination plans
	Refund of excise duty for mineral oils used for purposes other than motor fuel or motor fuel.	Law 38/1992 on Excise Duties Article 52			All the amount of the IEH (fuel function)	
	Refund of the tax for fuelling and provisioning of gas oil to vessels for navigation other than private pleasure craft	Law 38/1992 on Excise Duties Article 52			All the amount of the IEH (fuel function)	
	Refund of the tax on the use of mineral oils in pilot projects for the technological development of less polluting products or mixed with other contaminated products	Law 38/1992 on Excise Duties Article 52			All the amount of the IEH (fuel function)	
	Partial refund of excise duty on mineral oil for commercial use (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/l	
	Partial refund of excise duty on hydrocarbons on diesel used in agriculture and livestock farming	Law 38/1992 on Excise Duties Article 52b	0,379	0,06371	EUR 0,31529/l	

**Table A.41. Measures to eliminate fossil fuel dependency**

Name or Description	Sector	Objective	Vector	Start of implementation	End of implementation	2.020	2.021	Currency
Grant of aid for energy rehabilitation of existing buildings (PAREER-II)	Dwellings	Support for energy efficiency	Renewable	01/01/2018	01/01/2025	6.927.320.524	7.887.722.273	EUR
Energy Renovation of Buildings Program (PREE)	Dwellings	Support for energy efficiency	Renewable	01/08/2020	01/01/2026			
Payment per capacity: Inversion Incentive to Availability – HIDRAULICA	Conversion-Electricity Production	Production support	Electricity	01/01/2008	—			
Excise duty on Rare Hydrocarbons – reduced rate of taxation biogas and stationary engines	Energy	Demand support	Biogas	31/10/2013	—			
Specific remuneration scheme for Renewable Energy, Cogeneration and Waste	Electric Power Production	Production support	Electricity	01/11/2014	—			
Decree 477/2021, of 29 June, testing the direct granting 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 Imacenation, using renewable energy sources, as well as the occurrence of renewable thermal systems in the residential sector, within the framework of the Plan de Recuperación, Transformación y Resiliencia.	Dwellings, Industry, Public Sector	Production support	Renewable	30/06/2021	31/12/2023			
Decree 1124/2021, of 21 December, testing the direct granting of aid to the Autonomous Communities and the cities of Ceuta and Melilla for the implementation of incentive programmes for the introduction of thermal renewable energy applications in different sectors of the economy, in the area of the Recovery, Transformation and Resilience Plan.	Dwellings, Industry, Public Sector	Production support	Renewable	23/12/2021	31/12/2023			
MOVES Plan I, II, III	Transport	Support for energy efficiency	Petroleum derivatives	01/01/2019	31/12/2023			

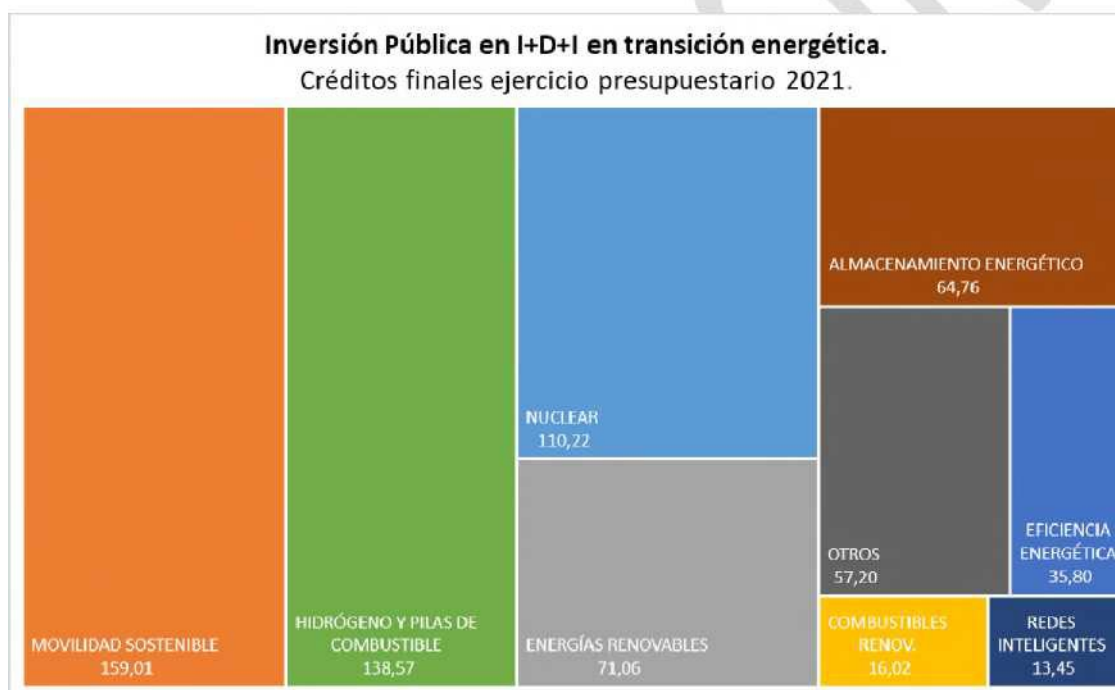


## A.6 ANNEX ON PUBLIC INVESTMENT IN RESEARCH AND INNOVATION

This section contains the latest available information on public investment in research, development and innovation related to energy transition policies.

In the budget year 2021, the amount earmarked for expenditure on R & D & I in the field of energy transition was EUR 666,1million<sup>180</sup>. The figure shows the distribution of expenditure by technology, with sustainable mobility and hydrogen and fuel cell technologies accounting for 23.9 % and 20.8 % respectively as the areas with the highest funding.

Figura A.11. Distribución del gasto en I+D+I por tecnologías



Fuente: Elaborado a partir de la Estadística de Créditos Presupuestarios. SICTI. Ministerio de Ciencia e Innovación

This expenditure represents 5.92 % of total public R & D & I appropriations in 2021. 88 % come from the General State Budget and 12 % from the Autonomous Communities' budgets. On the part of the AGE, the expenditure relates mainly to the Ministry of Science and Innovation and its dependent bodies, both funders (AEI, CDTI) and implementers (CIEMAT, CSIC), managing 68.9 % of the total. The Ministry for the Ecological Transition and the Demographic Challenge manages 17.6 %, with IDAE responsible for managing a large part of the amount.

Public funding is articulated and implemented through different instruments and forms of participation. The table below shows the distribution by purpose of funding. It can be seen that the most resourced public investment instrument is the financing of R & D projects, which are awarded mainly through competitive calls or open lines, with different forms of aid (grants, repayable aid, partially repayable aid).

Table A.42. Distribution of public funding by instruments and forms of participation

Purpose of funding	Amount EUR	Weight %
--------------------	---------------	----------

<sup>180</sup>This amount includes the expenditure appropriations of the SGPs and of the regional budgets, regardless of the source of funding (including funds from the EU Recovery and Resilience Facility) and excluding financial appropriations.

Funding of R & D projects by AGE funding agencies (AEI, CDTI, IDAE)	259,3	38,9
Supplementary Plan for Energy and Renewable Hydrogen	69,2	10,4
R & D implemented by Public Research Organisations (CIEMAT, CSIC, INTA)	112,0	16,8
Direct funding to national and international infrastructures and bodies (ITER, CERN, EU-SOLARIS, IFMIF-DONES,...)	108,0	16,2
Direct aid for the establishment and maintenance of State-owned public R & D centres (CENER, CNH2, CNIAE, CIUDEN, etc.)	51,5	7,7
Others (1)	66,1	9,9
<b>TOTAL</b>	<b>666,1</b>	<b>100,0</b>

(1) It includes direct funding to regional R & D bodies and aid for R & D projects managed by regional agencies.

The Supplementary Plans are a new instrument for establishing partnerships with the Autonomous Communities (ACs) on R & D & I actions that combine common priorities of regional and national smart specialisation strategies. In particular, 10 ACs participate in the Supplementary Plan for Renewable Energy and Hydrogen. Aragon, the Principality of Asturias, the Canary Islands, Cantabria, Castile-Leon, Castile-La Mancha, Madrid, Extremadura, Navarre and the Basque Country) and the CSIC. The plan has a total public investment of EUR 92 billion co-financed through Recovery, Transformation and Resilience Plan funds and regional funding. When implementing the supplementary plans, the Autonomous Communities may organise various initiatives such as direct aid or calls for proposals to finance R & D & I projects. Only the expenditure part corresponding to the 2021 budget year is included in the table.

In addition, the CDTI manages other types of instruments, such as the INNVIERTE Company, which aims 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 participation of private capital in the long term through investment in public-private vehicles. In 2021, through INNVIERTE, equity investments were approved in five energy, environmental and sustainable mobility companies. The commitment made 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. The beneficiary companies' activities relate to self-gas engines for heavy-duty vehicles, rigid boat candles, online photovoltaic power generation management, gasification waste disposal technology and control system for optimising wastewater treatment processes.

## A.7 ANNEX ON PUBLIC INVESTMENT IN RESEARCH AND INNOVATION

### A.7.1 Table Annex I Part 2 PNIEC Scenario 2023-2030

Table A.43. Parameters, variables and balance sheets of the 2023-2030 PNIEC scenario

		2020	2025	2030	
<b>1. General parameters and variables</b>					
1	Population	millions	47,33	47,85	48,35
2	GDP (constant 2016)	EUR billion	1.060,9	1.235,8	1.345,5
4	Number of households	millions	18,75	19,68	20,32
5	Household size	inhabitants/househo	2,52	2,43	2,38
7	Passenger-km	million pkm			
	Buses	million pkm	24.834,90	60.856,05	84.016,58
	Cars	million pkm	388.008,00	451.947,49	398.760,92
	Motorcycles	million pkm	29.544,06	39.168,08	39.844,65
	Railway	million pkm	15.951,40	52.740,37	75.716,41
	Aviation	million pkm	NA	NA	NA
	Inland navigation	million pkm	NA	NA	NA
8	Freight transport	million tkm			
	Road	million tkm	274.919,60	317.195,97	324.346,54
	Railway	million tkm	98.969,60	20.488,12	33.218,43
	Inland navigation	million tkm	N/A	N/A	N/A
9	International import prices Error <small>Marker not defined.</small>	EUR/GJ			
	Petroleum	EUR/GJ	6,08	14,64	14,64
	Gas	EUR/GJ	2,95	12,55	10,74
	Coal	EUR/GJ	1,52	2,95	2,95
10	ETS carbon prices Error <small>Marker not defined.</small>	EUR/ton CO <sub>2</sub>	22,81	76,04	76,04
11	Exchange rate assumptions against the euro and the US dollar (if applicable)	Dollar/EUR	1,16	1,20	1,20
12	Number of heating degree days (HDD)		N/A	N/A	N/A
13	Number of cooling degree days (CDD)		N/A	N/A	N/A
14	Cost assumptions of the technologies used in modelling for the main relevant technologies.		See Table A.7	See Table A.7	See Table A.7
<b>2. Energy balances and indicators</b>					
<b>2.1 energy supply</b>					
1	Indigenous production by fuel type	ktoe	34.458,01	43.806,35	50.477,74
	Coal	ktoe	0,00	0,00	0,00
	Crude oil and petroleum products	ktoe	28,29	146,89	147,99
	Natural gas	ktoe	41,62	49,03	49,40
	Nuclear power	ktoe	15.174,00	15.209,46	10.189,15
	Renewable energy sources	ktoe	18.674,39	27.850,47	39.601,48
	Waste	ktoe	539,72	550,50	489,72
2	Net imports by type of fueland 181 182	ktoe	76.371,72	67.992,95	51.700,70
	Coal	ktoe	3.099,84	1.404,18	1.087,90
	Crude oil and petroleum products	ktoe	45.661,24	47.077,87	36.985,01
	Natural gas	ktoe	27.873,77	20.329,11	17.958,28
	Electricity	ktoe	281,99	—	—
	Renewable energy sources	ktoe	—	159,43	29,39
3	Import dependency from third countries	%	68.91	60.82 %	50.60 %
4	Main import sources (countries) with main energy carriers (including gas and electricity) 182				
	First country of origin of electricity imports (FR)	% of total imports		54.48 %	41.15 %
	Second country of origin of electricity imports (PT)	% of total imports		44.19 %	57.07 %
5	Gross inland consumption by fuel type	ktoe	110.829,73	111.799,29	102.178,44
	Coal	ktoe	3.099,84	1.404,18	1.087,90
	Crude oil and petroleum products	ktoe	45.689,52	47.224,75	37.133,00
	Natural gas	ktoe	27.915,39	20.378,14	18.007,67
	Nuclear power	ktoe	15.174,00	15.209,46	10.189,15
	Electricity	ktoe	281,99	—	—
	Renewable energy sources	ktoe	18.129,25	28.009,89	39.630,87
	Waste	ktoe	539,72	550,50	489,72
<b>2.2 electricity and heat</b>					

181Including electricity and divided between intra-European and extra-European.

182Only imports of electricity are included.

	Units	2020	2025	2030
<b>1</b> Gross electricity production	<b>GWhe</b>	<b>263.373,00</b>	<b>296.975,12</b>	<b>358.743,56</b>
<b>2</b> Gross electricity production by fuel	<b>GWhe</b>			
Nuclear power	GWhe	58.299,00	58.389,47	39.116,37
Coal	GWhe	5.852,89	110,01	110,01
Crude oil and petroleum products	GWhe	12.002,50	7.448,77	4.570,88
Natural gas	GWhe	68.896,17	30.596,15	32.296,17
Biomass & waste	GWhe	6.292,00	6.612,61	8.926,38
Hydraulic (excluding pumped)	GWhe	30.507,00	31.146,50	31.139,51
Wind	GWhe	56.444,00	80.128,14	110.899,63
Solar	GWhe	20.667,00	71.517,23	114.373,34
Geothermal and other renewable energy sources	GWhe	921,00	1.360,97	2.788,81
Storage	GWhe	3.491,00	9.665,25	14.522,46
Other	GWhe	0,00	0,00	0,00
<b>3</b> Share of electricity generation from cogeneration in total <sup>183</sup>	<b>%</b>	<b>11.24</b>	<b>6.71</b>	<b>4.91 %</b>
<b>4</b> Power generation capacity by sources <sup>184</sup>	<b>GW</b>	<b>115,02</b>	<b>166,94</b>	<b>213,96</b>
Nuclear power	GW	7,40	7,40	3,18
Coal	GW	10,22	0,02	0,02
Crude oil and petroleum products	GW	4,19	3,22	2,05
Natural gas	GW	31,44	30,30	30,06
Biomass & waste	GW	1,07	1,47	1,84
Hydraulic (excluding pumped)	GW	14,01	14,26	14,51
Wind	GW	26,75	42,14	62,04
Solar	GW	13,30	59,04	81,19
Geothermal and other renewable energy sources	GW	0,21	0,26	0,52
Storage	GW	6,41	8,83	18,54
Other	GW	0,00	0,00	0,00
<b>5</b> Heat generation from thermal power generation	<b>GWhe</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
<b>6</b> Heat generation by cogeneration plants <sup>185</sup>	<b>GWhe</b>	<b>25.995,42</b>	<b>20.267,22</b>	<b>19.062,25</b>
<b>2.4 energy consumption</b>				
<b>1</b> Primary energy consumption (excluding non-energy consumption)	<b>ktoe</b>	<b>105.026,2</b>	<b>106.682,64</b>	<b>96.664,43</b>
<b>1</b> Final energy consumption (including non-energy consumption)	<b>ktoe</b>	<b>78.741,77</b>	<b>82.950,33</b>	<b>75.722,84</b>
<b>2</b> Final energy consumption by sector (excluding non-energy consumption)	<b>ktoe</b>			
Industry	ktoe	18.604,39	19.504,78	18.952,21
Residential	ktoe	14.377,47	13.604,79	12.528,72
Tertiary	ktoe	9.322,39	8.806,26	8.403,32
Transport	ktoe	27.634,82	32.806,60	27.286,33
Agriculture	ktoe	2.999,14	3.111,25	3.038,24
Carriage of passenger	ktoe		20.927,23	17.121,12
Carriage of goods	ktoe		11.859,73	10.121,44
<b>3</b> Final energy consumption by fuel (excluding non-energy consumption)	<b>ktoe</b>			
Coal	ktoe	396	229,72	192,34
Crude oil and petroleum products	ktoe	34.133	35.844,12	27.636,48
Natural gas	ktoe	13.819	13.254,13	11.503,70
Electricity	ktoe	18.887	20.946,60	22.071,54
Heat energy	ktoe			
Renewable energy sources	ktoe	5.511	7.206,19	8.396,79
Waste	ktoe	193	352,91	407,98
<b>4</b> Final non-energy consumption	<b>ktoe</b>	<b>5.803,56</b>	<b>5.116,65</b>	<b>5.514,01</b>
<b>5</b> Primary energy intensity of the general economy <sup>186</sup>	<b>toe/million euro</b>	<b>104,47</b>	<b>90,47</b>	<b>75,94</b>
<b>2.6 investments</b>				
Energy-related investment costs <sup>187</sup> compared to GDP <sup>188</sup> Marker not defined.	<b>% of GDP</b>		<b>2.1 %</b>	<b>2.5 %</b>
<b>2.7 renewable energy</b>				
<b>1</b> Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption by sector and by technology <sup>187</sup>	<b>%</b>			
Share of renewable energy in gross final energy consumption	<b>%</b>	<b>21.03</b>	<b>32.43</b>	<b>47.86 %</b>
Heating and cooling	<b>%</b>	<b>17.90</b>	<b>24.35</b>	<b>34.69 %</b>
Electricity	<b>%</b>	<b>43.69</b>	<b>71.91</b>	<b>92.17 %</b>
Transport <sup>188</sup>	<b>%</b>	<b>8 %</b>	<b>12.30</b>	<b>25.32 %</b>
Contribution of final consumption of renewable energy in transport to the overall target	<b>%</b>	<b>2.55</b>	<b>8.60</b>	<b>6.08 %</b>

183Electricity generated in the cogenerations divided by the gross electricity generated, including pumped generation.

184Including dismantling and new investments.

185Including industrial waste heat.

186Primary energy consumption/GDP.

Intermediate trajectories<sup>187</sup> are to be found in Table A.11.

188RED III methodology

		Units	2020	2025	2030
	Contribution of biofuel and biogas included under A <sub>d</sub> el II S <sub>1</sub> to <sub>d</sub> O <sub>d</sub> e <sub>1</sub> ne <sub>x</sub> (Error! Marker not defined.	%	—	4.57	3.47 %
	Contribution of biofuel and biogas included in section B <sub>d</sub> e <sub>1</sub> II S <sub>1</sub> to <sub>d</sub> O <sub>d</sub> e <sub>1</sub> ne <sub>x</sub> (Error! Marker not defined.	%	—	1.42	0.91 %
	Contribution of biofuels consumed in transport produced from food crops	%	—	2.56	1.42 %
	Contribution of other renewable fuels consumed in transport	%	—	0.06	0.27 %
	Gross final consumption of renewable energy in heating and cooling	ktoe	5.072,70	6.619,64	8.871,77
	Renewable energy production.	ktoe	9.847,90	17.964,51	24.892,55
	Gross final consumption of renewable energy in transport	ktoe	1.978,43	2.313,35	2.184,19
	Total gross final consumption of renewable energy	ktoe	16.312,30	26.897,50	35.628,56
	Share of biofuels from food crops	%	2.4 %	2.59	2.60 %
	Share of advanced biofuels <sup>189</sup>	%	2.5 %	10.71 %	12.26 %
	Combined share of advanced biofuels and biogas included in Annex IX, point A, and renewable fuels of non-biological origin (RFNBOs)	%	—	7.20	11.1 %
	Share of renewable fuels of non-biological origin (RFNBOs)	%	—	1.48	5.86 %
2	GHG intensity reduction in transport through the use of renewable energy	%	—	—	16.61 %
<b>3. GHG emissions and removals related indicators</b>					
1	<b>GHG emissions by sector (ETS, Effort Sharing Regulation and LULUCF)</b>	teq.CO <sub>2</sub>	<b>228.149.605</b>	<b>199.552.174</b>	<b>156.065.074</b>
	ETS emissions (ETS scope 2013)	teq.CO <sub>2</sub>	92.069.930	68.637.636	60.796.291
	Effort Sharing Regulation (in the areas of 2013)	teq.CO <sub>2</sub>	180.174.431	171.031.577	133.793.652
	LULUCF (accounted in accordance with the requirements of EU legislation)	teq.CO <sub>2</sub>	—	—	—
2	GHG emissions by IPCC sector and by gas (where relevant, broken down into ETS and ESR)	teq.CO <sub>2</sub>	<i>Please use for reporting on GHG emissions by IPCC sector and gas the same excel template as used for reporting on Annex XII to Commission Implementing Regulation (EU) 749/2014 (IPArticle23_table1), next due 15/3/2019. It is provided as separate file.</i>		
	Transformation, primary energy and trade	teq.CO <sub>2</sub>	10.030.667	9.194.915	6.791.383
	Agriculture	teq.CO <sub>2</sub>	34.674.952	31.746.039	28.438.928
	Electricity Generation	teq.CO <sub>2</sub>	30.766.353	12.151.710	10.890.964
	Industry (combustion)	teq.CO <sub>2</sub>	43.571.682	34.035.332	28.541.225
	Industry (processes)	teq.CO <sub>2</sub>	16.897.368	16.843.849	16.810.492
	Residential	teq.CO <sub>2</sub>	16.180.198	12.496.044	8.806.287
	Tertiary	teq.CO <sub>2</sub>	9.113.162	6.323.482	4.713.025
	Transport	teq.CO <sub>2</sub>	73.873.433	82.553.910	59.423.579
3	<b>Carbon intensity of the general economy</b>	teq.CO <sub>2</sub> /GDP (EUR million)	<b>215,053</b>	<b>161,479</b>	<b>115,993</b>
4	<b>Indicators related to CO<sub>2</sub> emissions</b>	teq.CO <sub>2</sub> /MWh			
a	<b>Carbon intensity of electricity and steam production</b>	teq.CO <sub>2</sub> /MWh	<b>0,117</b>	<b>0,041</b>	<b>0,030</b>
b	<b>Carbon intensity of final energy demand by sector</b>	teq.CO <sub>2</sub> /toe	<b>3,13</b>	<b>2,564</b>	<b>2,223</b>
	Industry	teq.CO <sub>2</sub> /toe	3,250	2,609	2,393
	Residential	teq.CO <sub>2</sub> /toe	1,125	0,919	0,703
	Tertiary	teq.CO <sub>2</sub> /toe	0,978	0,718	0,561
	Carriage of passenger	teq.CO <sub>2</sub> /toe	—	2,518	2,181
	Carriage of goods	teq.CO <sub>2</sub> /toe	—	—	—
5	<b>Parameters related to emissions other than CO<sub>2</sub></b>				
a	<b>Livestock</b>	<b>1000 Heads</b>			
	Dairy cattle	1000 Heads	810,5	800,5	778,1
	Cattle other than dairy cattle	1000 Heads	5.865,4	5.849,9	5.748,1
	Pigs	1000 Heads	32.085,5	30.305,2	26.390,4
	Sheep	1000 Heads	15.439,2	14.828,7	14.512,9
	Poultry	1000 Heads	134.732,7	132.837,0	134.411,6
b	<b>Nitrogen inputs resulting from the application of synthetic fertilisers</b>	<b>kt nitrogen</b>	<b>1.059</b>	<b>940</b>	<b>940</b>
c	<b>Nitrogen inputs resulting from manure application</b>	<b>kt nitrogen</b>	<b>533</b>	<b>529</b>	<b>528</b>
d	<b>Nitrogen fixed by N-fixing crops</b>	<b>kt nitrogen</b>	<b>NE</b>	<b>NE</b>	<b>NE</b>
e	<b>Nitrogen in crop residues returned to soils</b>	<b>kt nitrogen</b>	<b>189</b>	<b>168</b>	<b>168</b>
f	<b>Area of cultivated organic soils</b>	<b>hectares</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>
g	<b>Municipal solid waste (MSW) generation</b>	<b>Kg/hab· year</b>	<b>464</b>	<b>449</b>	<b>433</b>
h	<b>Municipal solid waste (MSW) going to landfills</b>	<b>%</b>	<b>49.4</b>	<b>38.4</b>	<b>25.0 %</b>
i	<b>Proportion of recovered CH<sub>4</sub> of the total CH<sub>4</sub> generated in landfills</b>	<b>%</b>	<b>22.6</b>	<b>24.3</b>	<b>24.3 %</b>

All parameters and variables marked in green:

They are already requested under current legislation (MMR, RES Directive or Energy Efficiency Directive).

All parameters and variables marked in red:

They should be provided considering the results of complementary tools such as standard energy system models.

TOD (s) the parameters and variables marked in orange:

Units	2020	2025	2030
-------	------	------	------

They correspond to indicators to be calculated with parameters and variables already available in the Excel file provided

**N/ A:** Not applicable. They have not been used.      **N/ A** not available.

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

BORRADOR

A.7.3 Tables Annex V, *Monitoring Mechanism Regulation (MMR)*

Table A.44. Greenhouse gas projections by gas and category

	Submission Year		2023
	Ms (Member State)		ES
Category Scenario (WEM, WAM, WOM)	2021	2025	2030
	CO <sub>2</sub> (kt)	CO <sub>2</sub> (kt)	CO <sub>2</sub> (kt)
Total excluding LULUCF WEM	230.269,46	225.527,56	219.466,33
Total including LULUCF WEM	185.287,49	186.264,94	183.208,81
Total excluding LULUCF WAM	230.269,46	186.450,81	147.384,22
Total including LULUCF WAM	185.287,49	146.052,32	108.577,90
	N <sub>2</sub> O (kt)	N <sub>2</sub> O (kt)	N <sub>2</sub> O (kt)
Total excluding LULUCF WEM	44,65	44,14	43,01
Total including LULUCF WEM	45,74	44,60	43,47
Total excluding LULUCF WAM	44,65	42,49	40,44
Total including LULUCF WAM	45,74	42,94	40,89
	CH <sub>4</sub> (kt)	CH <sub>4</sub> (kt)	CH <sub>4</sub> (kt)
Total excluding LULUCF WEM	1.481,87	1.387,47	1.284,71
Total including LULUCF WEM	1.487,93	1.393,42	1.290,66
Total excluding LULUCF WAM	1.481,87	1.334,92	1.170,11
Total including LULUCF WAM	1.487,93	1.340,72	1.175,91
	HFCs (ktCO <sub>2</sub> eq)	HFCs (ktCO <sub>2</sub> eq)	HFCs (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	3.612,74	3.468,38	3.287,92
Total including LULUCF WEM	3.612,74	3.468,38	3.287,92
Total excluding LULUCF WAM	3.612,74	3.468,38	3.287,92
Total including LULUCF WAM	3.612,74	3.468,38	3.287,92
	PFCs (ktCO <sub>2</sub> eq)	PFCs (ktCO <sub>2</sub> eq)	PFCs (ktCO <sub>2</sub> eq))
Total excluding LULUCF WEM	51,39	70,32	60,84
Total including LULUCF WEM	51,39	70,32	60,84
Total excluding LULUCF WAM	51,39	50,13	37,74
Total including LULUCF WAM	51,39	50,13	37,74
	HFCs/PFCs mix (ktCO <sub>2</sub> eq)	HFCs/PFCs mix (ktCO <sub>2</sub> eq)	HFCs/PFCs mix (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	1.350,56	796,55	104,03
Total including LULUCF WEM	1.350,56	796,55	104,03
Total excluding LULUCF WAM	1.350,56	796,55	104,03
Total including LULUCF WAM	1.350,56	796,55	104,03
	SF <sub>6</sub> (ktCO <sub>2</sub> eq)	SF <sub>6</sub> (ktCO <sub>2</sub> eq)	SF <sub>6</sub> (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	240,20	264,80	295,54
Total including LULUCF WEM	240,20	264,80	295,54
Total excluding LULUCF WAM	240,20	264,80	295,54
Total including LULUCF WAM	240,20	264,80	295,54
	NF <sub>3</sub> (ktCO <sub>2</sub> eq)	NF <sub>3</sub> (ktCO <sub>2</sub> eq)	NF <sub>3</sub> (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	NA	NA	NA
Total including LULUCF WEM	NA	NA	NA
Total excluding LULUCF WAM	NA	NA	NA
Total including LULUCF WAM	NA	NA	NA
	Total GHGs (ktCO <sub>2</sub> eq)	Total GHGs (ktCO <sub>2</sub> eq)	Total GHGs (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	288.847,82	280.674,03	270.583,69
Total including LULUCF WEM	244.325,83	241.699,96	234.614,73
Total excluding LULUCF WAM	288.847,82	239.669,21	194.589,94
Total including LULUCF WAM	244.325,83	199.552,17	156.065,07
	Total ETS GHGs (ktCO <sub>2</sub> eq)	Total ETS GHGs (ktCO <sub>2</sub> eq)	Total ETS GHGs (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	94.440,19	91.714,23	92.421,76
Total including LULUCF WEM	94.440,19	91.714,23	92.421,76

	Submission Year		2023
	Ms (Member State)		ES
Category Scenario (WEM, WAM, WOM)	2021	2025	2030
Total excluding LULUCF WAM	94.440,19	63.717,80	55.787,90
Total including LULUCF WAM	94.440,19	63.717,80	55.787,90
	Total ESD GHGs (ktCO <sub>2</sub> eq)	Total ESD GHGs (ktCO <sub>2</sub> eq)	Total ESD GHGs (ktCO <sub>2</sub> eq)
Total excluding LULUCF WEM	192.233,13	183.010,36	171.839,36
Total including LULUCF WEM	192.233,13	183.010,36	171.839,36
Total excluding LULUCF WAM	192.233,13	171.031,58	133.793,65
Total including LULUCF WAM	192.233,13	171.031,58	133.793,65

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

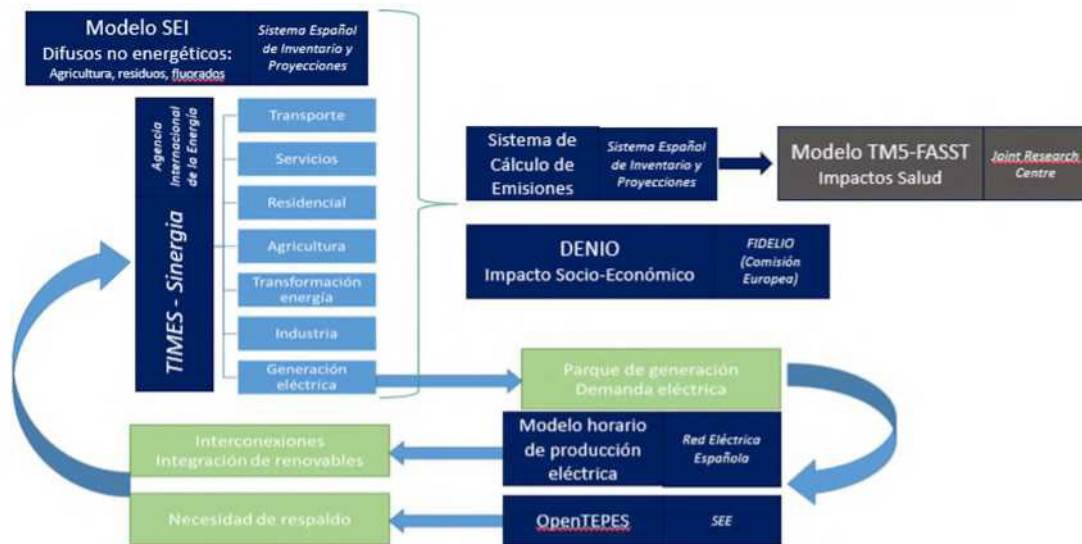
## ANNEX B – MODELS

### 8.1. ENERGY SYSTEM MODELLING

The energy system for the 2021-2030 PNIEC was modelled using the TIMES-Synergy (Integrated System for Energy Study) tool of the Subdirectorate-General for Foresight, Strategy and Regulation in the field of energy. Aid programme to improve the energy efficiency of existing buildings (PAREER-CRECE Programme). Plan to improve the energy efficiency of existing buildings and infrastructure belonging to central government (ERDF-POPE 2014-2020). The other model used, 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, 2023

While TIMES-Sinergia covers the entire energy system, 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 hourly periods for electricity generation and the incorporation of technical restrictions of the system's generation units.

The joint use of all models makes it possible to assess back-up needs, energy exchange on interconnections, as well as other technical issues resulting from the integration of high renewable energy inputs into the electricity system, such as discharges, or adjustments to conventional combined cycle generation. The figure depicts the two-way interaction between the energy system model TIMES-Synergy and the EER model. As shown by the results of the generation park in terms of installed capacity and generation of each technology, together with the electricity demand outputs obtained in the TIMES-Sinergia model, the REE model has been assessed. Subsequently, the outputs of this model have determined the operating requirements of the conventional generation park and the technologies, subsequently incorporating the results into TIMES-Sinergia. This exercise incorporates the technical restrictions contained in the specific electricity generation model into the general energy system model.

### 8.1.1. Model TIMES-Sinergia

In drawing up the NECP, the *Integrated MARKAL-EFOM System (TIMES) tool* was used to analyse the energy system and its foresight. National Energy Efficiency Action Plan, 2017-2020. *State Housing Plan*, 2018-2021.

Times has been used to model the energy system in more than 60 countries and is a tool widely used at European level, for example in Italy, Portugal, Finland or Norway.

In the case of Spain, the TIMES-Spain model was developed by the Centre for Energy, Environmental and Technological Research (CIEMAT) on the basis of 2005.

The Subdirectorate-General for Foresight, Strategy and Regulation for Energy (SGPEN), which reports to the Ministry of State for Energy of MITECO, has carried out the necessary work to use TIMES as a tool for foresight and energy analysis in the preparation of the NECP, adapting TIMES-Spain. The new model has been named TIMES-Sinergia (Integrated System for Energy Study).

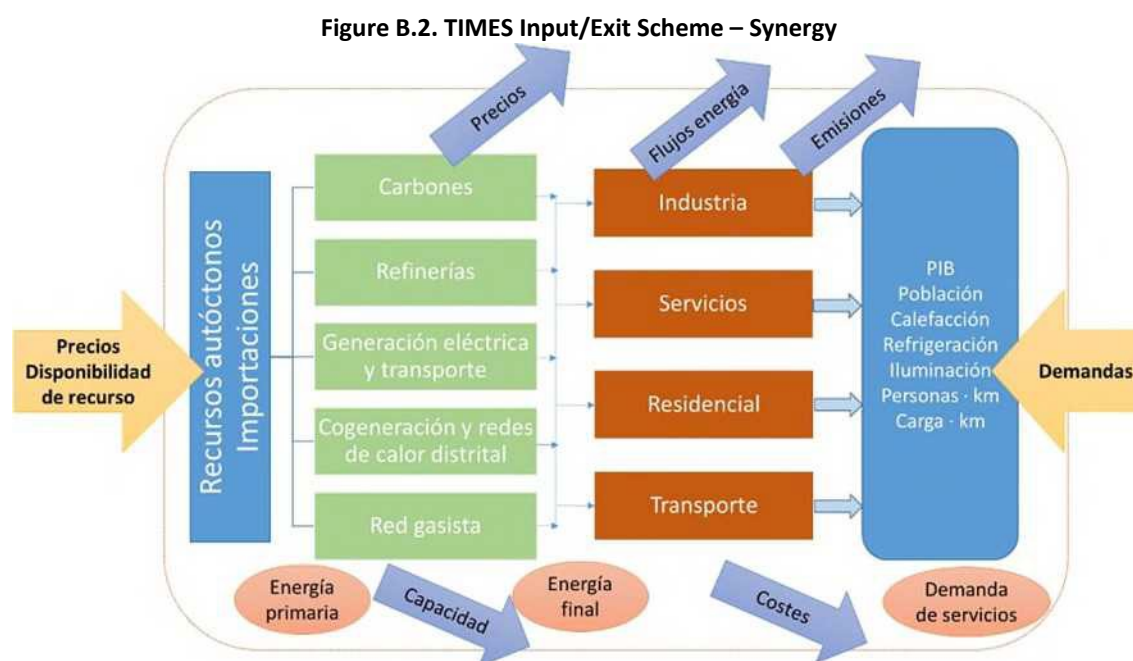
Times is a generator of *bottom-up mathematical models*. This means that the model uses each of the components of the energy system to subsequently obtain data at aggregate level. The TIMES model

generator combines two complementary approaches, one technical and the other economic. It is based on the linear optimisation of the energy system and seeks a solution under the minimum cost principle.

It has a detailed characterisation of energy technologies and demands for energy services, such as passenger-km for the transport sector, or production in tonnes for industrial sectors. For the different scenarios presented in the model, TIMES covers the demand for energy services by combining operational and investment decisions, minimising the cost of the energy system over the horizon analysed.

Some of the most relevant outcomes of the model are the consumption and production of energy goods and services, flows, or prices and costs of energy goods. It also provides emissions of GHG 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.

The figure shows the inputs and outputs of the TIMES-Sinergia model, which shows that, based on the parameters of service demand, energy prices and availability of resources, the model determines the capacity to be installed, energy consumed, emissions and process prices.



*Source: International Energy Agency*

### **Structure of the TIMES-Sinergia model**

The model uses a detailed database that allows the definition of the current and future energy system, by modelling the different sectors related to energy consumption. In this way, the national energy structure is characterised by:

- Definition of base year. It includes all variables, energy products and their energy flows for the year 2016. This introduces real historical data characterising the national energy system. This definition includes data on primary, final consumption and the 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 model input variables are included. These data make it possible to implement future scenarios for subsequent energy analysis.
- The parameters characterising existing and future technologies are their efficiency; the usage

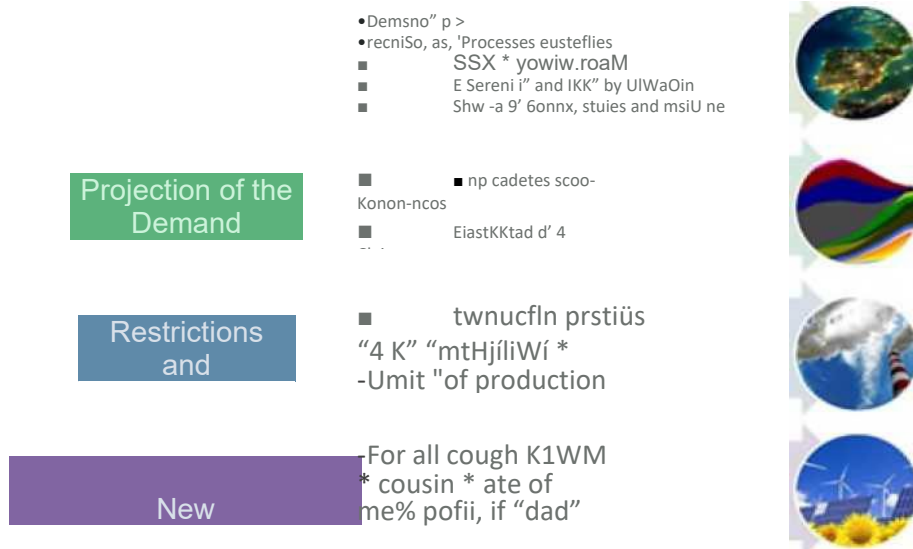
factor, which reflects the average hours of use of each technology out of the annual total; the existing park; the service life; and investment, operation and maintenance costs.

- New technologies and processes. The model also considers the various alternatives to meet future demands. To this end, an extensive database is available, including a portfolio of future technologies. These new technologies will enter the energy system, replacing the current ones at the end of their life, or by implementing other environmental or technical scenarios to replace them.
- Restrictions. They make it possible to incorporate into the model the effect of policies and measures, environmental or physical restrictions and other constraints in the projections.

- **Scenarios.** They allow different energy system snapshots to be represented for further analysis. By studying different scenarios, different options for future developments can be analysed and the influence of the different energy policies adopted can be assessed.

Below is a diagram with the data structure of TIMES-Sinergia.

**Figure B.3. TIMES-Synergy data structure**



Source: International Energy Agency

The following figure shows the different parameters that characterise technologies.

**Figure B.4. Parameters characterising technologies in TIMES-Synergy**



Source: International Energy Agency

Two types of scenarios have been considered in TIMES-Sinergia: the reference energy system or baseline scenario and the target 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 were not implemented. The target scenario presents the same evolution, but where the policies and measures proposed to achieve the objectives are met.

**General modelling**

**Spatial and temporal resolution in TIMES-Synergy**

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, historical data from the year 2017 are used to calibrate the model and then over 5-year periods, the years 2020 to 2040.

Times Synergia reflects the variability of demands throughout the year and day through *Time Slices*, which makes 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, autumn – F, winter – W), which in turn subdivide them into sections: day-D, noche-N, pico-P (coinciding with the hours of highest electricity demand in each station) and valle-V (including the hours with the lowest electricity demand).

The time structure of each year is thus divided into 16 slots, for example one of them, summer and night. These temporary divisions are used both to model demands for energy technologies and to represent generation profiles.

**Table B.1. Time periods. Annual distribution**

Stations	No of days	Fraction of the 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**

	D	P	N	V
R	10	3	5	6
S	10	3	5	6
F	10	3	5	6
W	10	3	5	6

Source: International Energy Agency

**Table B.3. Time periods. Slots**

	D	P	N	V
R	09:00-11:00 15:00-21:00	12:00-14:00	22:00-00:00 07:00-08:00	01:00-06:00
S	09:00-11:00 15:00-21:00	12:00-14:00	22:00-00:00 07:00-08:00	01:00-06:00
F	09:00-18:00	19:00-21:00	22:00-00:00 07:00-08:00	01:00-06:00
W	09:00-18:00	19:00-21:00	22:00-00:00 07:00-08:00	01:00-06:00

Source: International Energy Agency

### Estimation of emissions

Emissions from energy sectors, both from combustion (CRF activity 1A), and fugitive emissions (CRF activity 1B), as well as emissions from industrial processes (CRF activities 2A, B and C) have been carried out using the projected activity variables as a result of the scenarios generated by the TIMES-Synergia model.

In addition, 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 representative activity variables for each sector.

On the projections of the activity variables, emissions and, where applicable, removals have been estimated for each of the GHGs using calculation methodologies similar to those implemented

in the National Emissions Inventory and consistent with international methodological guidelines. The 2023 edition of the National Greenhouse Gas Emissions Inventory, corresponding to the 1990-2021 series, has been used as a reference for the calculation of projected emissions.

Projected emissions estimates have been made jointly and consistently for both GHG (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and fluorinated gases) and associated air pollutant emissions (NH<sub>3</sub>, NMVOC, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>) included in the National Air Pollution Control Programme.

The base year for the projected series is the 2021 reporting year. The geographical coverage used has been unique for the whole national territory, assuming average characteristics and parameters. Historical data from the National Emissions Inventory (1990-2021) have been used for the analysis of emission trends and emission factors (direct and implicit). The projected time horizon has been 2022-2030 with annual time periods. As in the National Emission Inventory, the 2006 IPCC Guidelines and the EMEP/EEA 2019 Methodological Guides have been used as reference methodological guidelines.

### **Baseline data and macroeconomic assumptions**

The database on which the TIMES-Sinergia model is based is based on various sources. For historical data, in the case of energy variables, it is based on the energy balances published by Eurostat, which, in turn, are compiled on the basis of data provided by the national statistical system. For their part, in the data on historical energy production and consumption in the industrial sector, statistics from the General State Administration have been used, available in the Spanish Emission Inventory System.

In addition, in order to design future scenarios, the demands for end-use energy services are projected. To this end, macroeconomic variables such as GDP, GDP per capita or number of households are taken into account, determining the elasticity or relation of demand for energy services to these macroeconomic variables. Finally, using GDP projections, the input values of the model for energy service demands in future time periods are determined, taking into account both the evolution of macroeconomic variables and their elasticities to demand.

The prices of CO<sub>2</sub> allowances subject to the 190 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 to identify primary and final energy needs and to characterise electricity generation demands and production needs in the energy transformation sector, aggregating their demands.

#### **Residential sector, services and others**

The residential sector, services and others include the coverage of the demands of the residential sector, which includes energy needs in the household sector, and the services and other sectors, which includes demands for energy services originating from buildings with public and private economic activity (commercial, health, public, work centres, etc.), as well as the other sector, which represents the sectors of economic activity not included in the other TIMES-Sinergia disaggregations, and which is modelled on an aggregate basis.

---

190ETS: Emission Trading Scheme.

The residential and service sectors decompose their demands for energy services according to final energy uses, including the categories of demand for heating, cooling, lighting, hot water, kitchens and miscellaneous electrical and electronic equipment (white line, brown line and others specific to the use of each building). In addition, street lighting claims are included.

For the residential sector, three types of dwellings are included: single-family dwelling, multi-family dwelling with collective heating or domestic hot water systems and multi-family dwellings with individual heating or domestic hot water systems. It also distinguishes between existing and newly built or renovated dwellings. This reflects the differences in energy consumption patterns for the different building types considered, as well as the diversity of technologies installed in each type.

In the case of the service sector, no distinction is made according to the type of building 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 below and categorised according to the coverage of the corresponding energy service:

- a) **Fuel for heating Stoves, convectors, chimneys, solar panels and heat pumps** have been included. These technologies are in turn divided according to the fuel or energy source used (coal, propane, diesel, gas, solar, electricity, geothermal, aerothermia, hydrothermia or renewable heat generation).
- b) **Cooling. Aerothermal, geothermal and hydrothermal heat pumps, solar cooling and absorption machines** have been modelled.
- c) **ACs (Healthcare Water). The model** comprises mixed boilers, heaters, heaters and heat pumps. There are different technologies of each type depending on the fuel or energy source used (coal, propane, diesel, gas, solar, electricity, geothermal, aerothermia, hydrothermia or renewable heat generation).
- d) **Lighting in buildings and street lighting. Incandescent, halogen, LED and fluorescent lamps** are used.
- e) **Cookers. In the residential sector**, it comprises technologies that run on different fuels (firewood, coal, gas, propane or butane and electricity). For its part, the services sector includes a generic technology called 'kitchen equipment' which covers a variety of equipment used in service kitchens, such as the kitchens themselves, but also ovens, Vaporeras, hot tables, etc.

In addition, some technologies identified above, simultaneously cover several demands for energy services. This is the case for gas 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 above technologies is characterised by a number of parameters detailed below. These parameters shape their energy performance:

- **Efficiency.** Their evolution over time is defined by learning curves in such a way that efficiency improvement paths are taken into account over the periods under consideration.
- **The availability factor**, given by a ratio reflecting the average hours of use of each technology to the annual total.

- The **existing park** characterising the number of units of each technology.
- The **lifetime** of each technology.
- **Cost.** It includes both **investment** costs for new technologies **and operating and maintenance** costs for new and existing technologies.

In addition to the above, in the residential sector the equipment included in the white and brown line categories has been modelled on an aggregated basis. Similarly, this approximation has been made for other own uses associated with the use of the building in the service sector.

The starting data and assumptions of the residential sector, services and others with the greatest influence on the results of the model stem from the change in the number of both existing and newly built households; or built-up area in the service sector, whether existing, new or reformed.

### Transport sector

The transport sector is an energy-consuming sector that brings together demands for energy services for mobility, both for people and goods. These service demands are expressed in millions of passengers· km or million tonnes· km for the different modes of transport: road, rail, sea and air.

Within the TIMES-Sinergia model, different categories of vehicles can be distinguished to meet these demands for energy services. In turn, within these categories, each vehicle is differentiated according to the type of fuel it uses, being gas, electricity, diesel, petrol, biofuels, compressed or liquefied natural gas. In particular, blending biofuels with traditional fossil fuels has been considered.

The different types of vehicles are detailed below according to the demand for energy services they satisfy, covering both existing and future technologies:

- a) **Road transport.** It includes the various types of transport of goods and persons:
  - **Passenger cars.** Demand is divided into short and long distances.
  - **Motorcycles and quadricycles.** They are assumed to be primarily involved in short distance demand.
  - **Buses.** City and inter-city buses have been modelled.
  - **Heavy cargo (trucks).** It includes vehicles of more than 3,5 tonnes covering the demand for freight transport.
  - **Light load (Vans).** It covers vehicles of less than 3,5 tonnes of freight used primarily for the transport of goods over short distances (urban environment).
- b) **Rail transport.** Includes rail-borne vehicles powered by electricity or diesel.
  - **Passenger trains.** It includes long-distance and medium-distance trains in addition to commuter trains.
  - **Freight trains.**
  - **Metros and trams.** All vehicles are electric and meet the demand for urban transport.
- c) **Transport in aviation and navigation.** Aggregate demand for national aviation, international aviation and navigation is modelled. In addition, energy is included in bunkers.



The parameters characterising the functioning of technologies in the transport sector are:

- **Efficiency.** Their evolution over time is defined by learning curves in such a way that efficiency improvement paths are taken into account over the periods under consideration.
- **The availability factor,** given by a ratio reflecting the average hours of use of each technology to the annual total.
- **The activity factor,** which indicates the occupancy ratio of the vehicle, in terms of tonnes for goods vehicles or persons.
- The **existing park** characterising the number of units of each technology.
- The **lifetime** of each technology.
- **Cost.** It includes both **investment** costs for new technologies **and operating and maintenance** costs for new and existing technologies.

The starting data and assumptions of the transport sector that most influence the results of the model are the penetration of new technologies, especially those using alternative fuels, as well as the biofuel mix in the transport sector.

### Industrial sector

In this sector, end-use energy demands are determined on the basis of output in physical units (tonnes) of industrial products. To this end, it has been divided into sub-sectors relevant in terms of consumption, including both the technologies used in industrial processes and the demands relating to each of these processes, be it heat or electrical demands. Industrial production is an input to the model determined by the evolution of GDP. This macroeconomic parameter and the elasticity that links it to industrial production determine the sectoral output.

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, the other industrial sectors are modelled on an aggregated basis, 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. Different technologies are included depending on the energy source they use, including coal, refinery gas, fuel oil, natural gas, biomass, waste and biogas.

Each of the above technologies is characterised by a number of parameters detailed below:

- **Output ratios.** They indicate the relationship between production of physical units and energy consumed.
- The **existing park.**

- **Percentages of fuel consumption.** They are used in the case of technologies that can use different fuels.
- **Investment, operation and maintenance costs.**
- **Shelf life.**
- **Electrical and thermal efficiency.**
- **Partition coefficient between the energy discharged into the grid and the heat produced,** for cogenerations.
- **The availability factor,** given by a ratio reflecting the average hours of use of each technology to the annual total.

The most relevant input data and assumptions for the industrial sector are related to the evolution of production and industrial processes used.

### **Agriculture sector**

Includes agriculture, livestock farming, forestry and fisheries. The sector is included in the model in an aggregated form, characterised by its energy consumption profile for the different fuels and energy used. In these sectors, only their behaviour as energy consumers is modelled.

### **Primary energy sector, transformations and exchanges**

Unlike the sectors described above, the primary energy sector, transformations and exchanges represent the energy transformations needed to convert primary energy into final energy, i.e. it represents a part of the energy transformation sector, excluding the electricity generation sector which is modelled in detail and described in the following section. The sector comprises primary production, i.e. the extraction of fuels, crude oil, natural gas and coal (coal, anthracite and lignite), as well as domestic renewable energy generation potentials: biomass, waste, waste heat, hydropower, wind, solar and geothermal energy.

In addition to this, industries associated with energy transformation or secondary energy production are taken into account, bringing together coke ovens, refineries, biofuel production and electricity transport.

In addition, in order to source primary energy, the system considers the supply of fuels by means of imports. Similarly, exports made by the region are included.

### **Electricity generation sector**

The model is based on the generation fleet existing in the base year 2016 and meets the electricity demand of the other sectors, looking for the economic optimum of the overall energy system over the given horizon. To this end, it installs new generation capacity where necessary, taking into account all costs and operational 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, useful life of technologies, fuel costs, distribution of fuels by technology, consumption in auxiliary 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 unique node system, including non-mainland territories, although account is taken of the losses inherent in the transmission and distribution network, as well as the different cross-border connections and the expected increase in capacity.

Finally, it is necessary to establish a series of contour restrictions, mainly relating to the characteristics and functioning of generation technologies, thereby seeking to bring the model's behaviour closer to reality.

A number of generation technologies existing in the base year (2016) have been considered, as well as a number of new technologies, which would be those that would enter into service from 2016 onwards.

The existing technologies considered are classified as:

- Conventional generation facilities:
  - Nuclear
  - Coal
  - Combined gas cycle
  - Fuel/Gas (non-mainland territories)
  - Municipal solid waste (MSW) (half of the generation of this technology is considered renewable, due to the biodegradable fraction of MSW)
- Renewable energy generation and pumping facilities:
  - Biomass
  - Biogas
  - Solar thermoelectric
  - Solar photovoltaic
  - Wind (onshore and offshore)
  - Hydraulic
  - Hydraulic pumping installations
  - Municipal solid waste (MSW) (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 solely and exclusively installations for the generation of renewable energy and storage.

In addition to new installations (put into service after 2016) of existing technologies, the following technologies have been included, not present in the generation park of the base year:

- New generation technologies with renewable energy and storage:
  - Solar thermoelectric with more than 9 hours of storage
  - Batteries with 2 hours of storage
  - Offshore energy technologies

- Geothermia

The parameters that characterise electricity generation technologies are:

### **Operating profiles**

The different generation technologies have a performance profile defined through the availability factor. It is expressed as one and relates to the hours at which the technology is available over a period with the totality of the hours of that period.

In TIMES-Synergy, the availability factor indicated for each technology corresponds to an upper limit referring to the maximum operating hours of each technology during the period considered, therefore it refers more to a maximum usage factor of the technology, rather than to availability.

The following types of availability factors are defined in TIMES-Synergy:

- **Annual availability factor:** this annual factor, expressed as one, indicates the relationship between the maximum operating hours of the technology in one year and the total annual hours.
- **Time slice:** this factor per period, also expressed as one, indicates the relationship between the maximum operating hours of the technology in a given period and the total hours of the same period.

The definition of temporary availability factors is particularly relevant for renewable energy generation technologies, which will be more or less available depending on the availability of the renewable resource they use as a source of energy. Thus, there will be technologies with lower availability in times when electricity demand is high, while others, on the contrary, will have a higher availability with peak demand, depending on the season of the year and the period under consideration.

In the case of conventional generation technologies, availability factors per period are usually constant, providing information, in this case, on the times when the technology is no longer available due to maintenance activities, technical constraints, or other causes unrelated to the availability of the resource.

### **Efficiency**

The efficiency data for both conventional and renewable thermal generation installations have been obtained from the data reported to Eurostat, which are considered constant over the whole horizon. No account is taken of possible reductions in performance throughout the period. For technologies where more than one fuel is consumed, one efficiency is given for each fuel.

For new technologies, not present in the generation park of the base year, efficiencies provided by the *Joint Research Centre* (JRC) have been considered.

In the case of renewable energy generation technologies (solar photovoltaic, wind, hydropower with the exception of 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, fuels, etc.

**Life time**

The service life considered for renewable energy generating installations is that laid down in Order 1045/2014 of 16 June 2014 approving the remuneration parameters for standard installations applicable to certain plants producing electricity from renewable energy sources, cogeneration and waste, with the following exceptions:

- For new installed wind power, a lifetime of 25 years is considered for both onshore and marine installations.
- In the case of hydraulic installations, the lifetime extension over the whole horizon is considered.

For installations of non-renewable technologies, the following criteria have been taken into account:

- Nuclear: the baseline scenario considers the extension of the lifetime 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 stations that have carried out the work necessary to bring them into line with European emissions legislation by 2020 (around 4.53 GW) will continue to operate until 2030.
- Combined gas cycle: a useful life of 40 years is considered.
- Fuel/Gas (non-mainland territories): It is estimated that the installed capacity of fuel/gas power stations in 2016 will be halved in 2030.

With regard to the service life and decrease in generation capacity of the various technologies present in the generation park of the base year (2016), in order to establish the closure of the installations of that generation park, the date on which they were brought into service was taken into account, to reflect a decrease in capacity in line with their useful life. Thus, the capacity of the various existing technologies considered will be progressively reduced (depending on their commissioning) and replaced, if necessary, by the generation capacity of new technologies available in the system from 2016 onwards.

**Consumption in generation**

Consumption in generation represents the auxiliary consumption of the various technologies. These have been introduced into the TIMES-Sinergia model as a percentage of the total electrical energy produced by each type of technology.

**Transmission and distribution system losses**

As stated above, the model simplifies the grid of the electricity system by treating it as a single hub, although the efficiencies associated with that system are established, allowing the existing losses both in the transmission and distribution of electricity in high, medium and low voltage networks and the losses associated with transformation processes from high to medium voltage and medium to low voltage to be modelled. These losses are modelled with efficiency coefficients associated with high voltage (0,989), medium voltage (0,974) and low voltage (0,916).

**Interconnections**

In TIMES-Sinergia, the following considerations have been taken into account when modelling interconnections:

- Interconnections with Morocco and Andorra: it is considered a constant net export balance per time period, calculated as the average of the actual values for the years 2014, 2015, 2016 and 2017.
- Interconnections with Portugal and France: both import capacity 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 with France have been taken into account, reaching 8.000 MW in 2030.

### **Penetration of renewable energy technologies**

A cap is set on the input of new generation power corresponding to photovoltaic and wind (onshore and offshore) technologies over the period 2020-2030.

### **Coupled thermal generation**

It is considered a minimum of constant thermal generation provided by all nuclear power plants, coal-fired power stations and combined cycle power plants. In addition, part of this minimum will correspond to the sum of the combined cycle and coal-fired power plants, of which another part will be provided exclusively by combined cycle power plants.

### **Calculation of availability factors**

The availability factors, both annual and by time period, 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, while for subsequent years an average of the years 2014, 2015, 2016 and 2017 was assumed, and for hydraulic technology the data for 2015, which is considered to be a year close to an average hydraulic year.

In water installations with a capacity of more than 10 MW and pumping facilities, these factors have been increased over time with the aim of increasing the ability of these technologies to adapt to the various generation parks in subsequent years.

For the other technologies, different annual AFAs 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 that will reach their end of life will be boosted to a greater or lesser extent depending on the technologies.

## **B.1.2 Model used by Red Eléctrica in Spain**

### **Methodology**

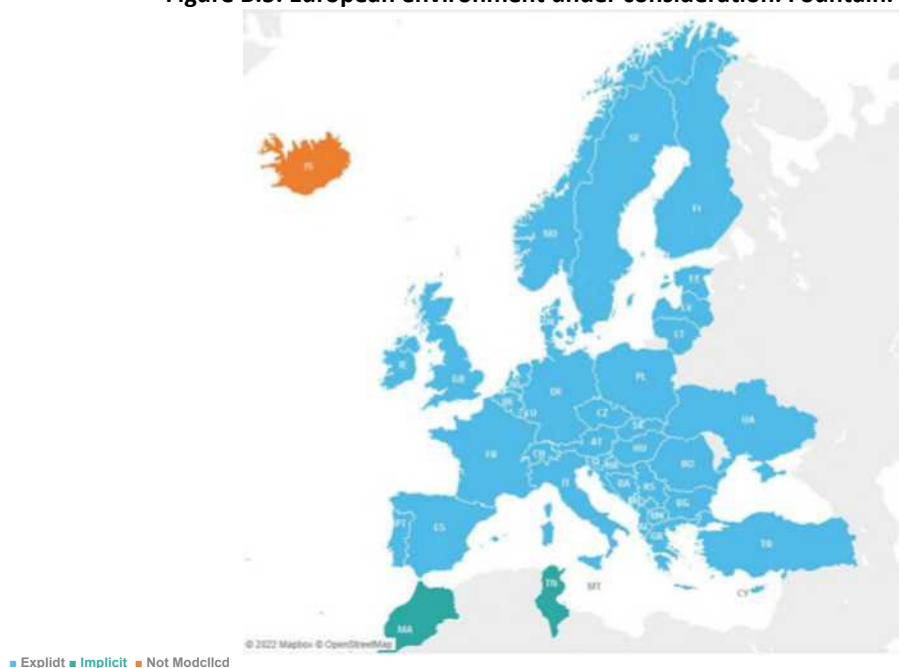
The analysis of the scenarios defined for the Spanish electricity system consists of simulating the dispatch of generation and the guarantee of supply for the adequacy analysis in the Spanish electricity system, under the assumptions described in Annex D.

This analysis is based on a European-level model used in the framework of ENTSO-E. This model is the basis for both energy balance studies and 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 unexplicitly modelled. Explicitly modelled ones are represented by market nodes that consider complete information using the best available input data resolution and for which the UCED problem is solved. For explicitly unmodelled areas, fixed exogenous energy exchanges with explicitly modelled areas are applied.

The graph below shows the countries that have been explicitly modelled, in blue, neighbouring countries that have been implicitly modelled, i.e. by fixed exchanges (green) and non-modelled countries (orange).

**Figure B.5. European environment under consideration. Fountain. ENTSO-E**



*Source: Red Eléctrica de España*

A simplified system model is used where the different modelled systems (bidding zones) are represented as a network of interconnected nodes by the commercial trading capacity available to the market (NTC) depending on the physical interconnections between them. In general, the model uses hourly trading capacity (NTC) values between modelled systems.

This is equivalent to the fact that within each bidding zone the generation dispatch calculation considers a single hub, i.e. any generation constraints due to internal network elements of each system are not taken into account. It is important to stress that this assumes in the model that the transmission system of the Spanish mainland system will have sufficient capacity to evacuate all the modelled generation and transport it to the points of consumption and that the variables of the electricity system remain within the ranges established by the legislation to achieve the level of safety required by the legislation. This will require the development and adaptation of such a network in such a way as to minimise renewable discharges or possible additional thermal generation needs due to possible internal grid constraints, so that only a reasonable minimum of possible distortions are introduced in respect of this single node assumption.

Simulations use as a baseline scenario a market of perfect competition in electricity generation and therefore do not include the potential strategies of generators to maximise their profits: the supply of each generator is equal to its estimated variable cost 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 time horizon analysed.

Variable generation cost values are based on the forecast fuel prices, estimated operating and maintenance costs of each technology and CO<sub>2</sub> emission<sub>costs</sub>. They are not considered as fixed generation costs, dismantling costs for groups currently in service and not considered in the scenario to be evaluated, any costs of extending the lifetime of generating groups or other factors (tolls, taxes) that may influence the supply strategy of the generation.

Cogeneration, renewable generation and, in general, all non-manageable generation is considered at zero variable cost, which gives them priority dispatch over other conventional thermal generation technologies.

For the purposes of calculating generation dispatch, each conventional thermal generation unit is modelled with its operating parameters, availability and unforeseeable failure rates. Hydropower generation is modelled consistently with historical production series and wind, photovoltaic and thermosolar generation using historical climate series of primary resource. Similarly, cogeneration and other generations are modelled according to historical data.

For each 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, loading and lowering times, must run, reservoir levels, minimum/maximum hydraulic power, etc.) while minimising the total variable cost. In the simulations, the results of which are presented below, a restriction on the thermal generation coupled in the Spanish Peninsular Electricity System (SEPE) of a minimum value sufficient to ensure the dynamic stability of the electricity system has been implemented. This minimum generation required corresponds to the generation of 3 nuclear groups and 7 combined cycle groups to the minimum technical for the 2030 scenario.

For this analysis, minimum frequency/power control reserves have been included in all European countries. The frequency control reserve used in Spain is 2 400 MW.

As a result, in hourly detail, the values of energy generated by each thermal unit and modelled generation technology, marginal cost values, interchange balance and other variables, such as energy not supplied if any, resulting from the process of minimising the total variable cost of the system respecting the values of exchange capacity and the rest of the constraints imposed on the model are obtained. It is very important to stress 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 commercial capacity value considered in the scenario.

Using these results, the generation balance and interest indicators are calculated, such as the total value of renewable generation and the fraction 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 set out in the model includes the NECPs in force in May 2023 for the various Member States, as this is the latest information available upto<sup>191</sup>date. This scenario is adapted in accordance with the MITECO scenarios considered in the preparation of this NECP for

---

<sup>191</sup>The data at European level used for this analysis are those contained in the 2022 edition of the ERAA, specifically the 'National Estimates' scenario, which corresponds to a scenario in which all countries translate their NIECs.



the 2030 horizon.

The inclusion in the European model of each scenario proposed by MITECO for the Spanish electricity system requires the adaptation of demand scenarios, renewable generation profiles, installed generation capacity of each technology and its dispatch characteristics to determine the values corresponding to the Spanish mainland electricity system, as well as the conversion of power values to net values. The scenarios obtained form the scenario, which is henceforth referred to as the adapted mainland scenario.

In addition, in the European scenario, the fuel cost assumptions assumed by MITECO are also changed. These new variable costs apply to both Spain and the entire generation park considered in the European model.

The set of assumptions described above forms the basis for calculating the variable unit cost of electricity generation for each generation technology for determining the resulting generation balance, and the energy not supplied if any, in order to minimise the cost of the system while respecting the constraints imposed on the model.

Finally, it should be noted that the generation scenario installed in the rest of the systems maintains 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 assumptions in the NECP. The process of updating the energy and climate plans by the Member States of the European Union, as in Spain, is in the process of being drawn up and, therefore, the result of the simulations of dispatch of electricity generation at European level could produce different results depending on the degree of update of those plans.

### **Simulation tool**

The simulation software package of folded electrical systems has been used to perform the simulations described in the previous paragraphs. The *plexes* tool, developed by *EnergyExemplar*, is a software package for modelling electrical systems. It integrates an electricity market modelling engine consisting of optimising the overall generation cost in order to determine the optimal solution to economic dispatch to meet demand, taking into account interchange capacities between nodes or areas, considering those capacities as technical system constraints, and may incorporate additional restrictions as a minimum synchronous generation scenario.

*Plexos* also includes a demand-side adequacy analysis tool that makes it possible to identify the needs for the system's demand coverage using the probabilistic methodology. This tool makes it possible to simulate a large number of climate years and situations of planned or post-generation unavailability using the Monte Carlo method. The usefulness of this tool for analysing the adequacy and economic dispatch of the electricity system is based on the following factors:

Linear optimisation systems. *Plexos* is able to linearise the economic dispatch problem in order to always obtain a valid solution. Their calculation systems are robust and robust; however, they require high calculation powers. In any case, they ensure a high consistency in the solutions.

— *Plexos* has the ability to incorporate complex restrictions in the problem of optimising the cost of generation in economic dispatch studies. These restrictions may model possible technical constraints in the system (overload, coupled generation minima, reserves, etc.) or restrictions applicable to generators, on their generation limits or on their offers to the market, allowing for the modelling of complex offers. In this way, *plexes* allow power systems to be modelled in great

detail and precision.

— 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 optimised management of storage resources (pumping, batteries or other). This resource is important for analyses of economic dispatch and demand coverage for the Spanish electricity system.

## **8.2. NON-ENERGY EMISSION MODELS**

### **8.2.1. PROJECTIONS FOR NON-ENERGY SECTORS**

#### **Introduction**

In addition to the modelling of the energy system for the 2021-2030 PNIEC, carried out using the TIMES-Sinergia model (see Annex B.1.1), emissions from the other non-energy sectors and emissions and removals from the LULUCF sector have been projected, on a case-by-case basis, according to national forecasts of the main representative activity variables for each sector.

On the projections of the activity variables, emissions and, where applicable, removals have been estimated for each of the GHGs using calculation methodologies consistent with those implemented in the National Emissions Inventory (IPCC Guidelines 2006 and EMEP/EEA 2019 Methodological Guides). The 2023 edition of the National Greenhouse Gas Emissions Inventory, 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 geographical coverage used has been unique for the whole national territory, assuming average characteristics and parameters. Historical data from the National Emissions Inventory (1990-2021) have been used for the analysis of emission trends and emission factors (direct and implicit). The projected time horizon has been 2022-2030 with annual time periods.

Projected emissions estimates have been made jointly and consistently for both GHG (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and fluorinated gases) and associated air pollutant emissions (NH<sub>3</sub>, NMVOC, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>) included in the National Air Pollution Control Programme.

The main features of the emission projection calculation systems for the most relevant non-energy sectors are briefly described below: agriculture, waste, land and product use, land use change and forests (LULUCF).

#### **Agricultural sector projections**

The estimation of projected emissions from the agricultural sector has been done consistently with the calculation system applied in the 2023 edition of the National Greenhouse Gas Emissions Inventory, corresponding to the 1990-2021 series and based on the IPCC 2006 and EMEP/EEA 2019 methodological guidelines using 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 input data to the system that have been taken into account in the projections are the livestock population and the consumption of inorganic fertilisers on fertilised land.

Forecasts of livestock trends for beef, dairy, sheep, pig (white and Iberian), poultry, rabbit, goat

and equine species for the projected period have been provided by MAPA, based on historical data and market forecasts for livestock production.

For each livestock population, in addition to the census data, in order to estimate the projected emissions, parameters relating to enteric fermentation and the management of country's own manure have been taken into account in a manner consistent with the National Emissions Inventory. These data are based on zootechnical documents containing specific data for Spain for each production species and on current data and forecasts on manure management systems. These calculations are carried out in a coordinated manner consistent with the estimation of emissions resulting from the application of manure to the field as an organic fertiliser (CRF sector 3Da2a) or from grazing activities (CRF activity 3Da3).

In order to estimate the projected emissions from crop management (CRF activities 3C, D, F, G and H), both the total areas cultivated (including rice) and the total quantity and typology of inorganic fertilisers applied in the field as fertilisers have been taken into account. These practices have also taken into account the current degree of implementation of Best Available Techniques and their foreseeable future evolution. The arable area used is consistent with the data inventoried in the latest edition of the National Emissions Inventory, as well as the data on the use and application of inorganic fertilisers, which are in turn consistent with the National Nitrogen Balances in Spanish Agriculture (BNPAE).

For the scenario with additional measures, the policies and measures described in the relevant chapter of this report have been taken into account.

Projected emission estimates for all agricultural activities have been made jointly and consistently for both GHGs (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) and associated air pollutant emissions (NH<sub>3</sub>, NMVOC, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>) included in the National Air Pollution Control Programme.

### **Projections for the waste sector**

For the projection of emissions from waste management and treatment, historical inventory data have been used as input data (since 1950 for landfilling and since 1990 for other activities). These data are consistent with the national official series (Subdirectorate-General for Circular Economy of MITECO and INE) and those published in EUROSTAT.

Forecasts of changes in total waste generation (CRF activities 5A, B and C1) and the distribution of management 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 policies and measures described in the relevant chapter of this report have been taken into account.

As regards emissions from waste water treatment (CRF activity 5D), for the projection it has been linked to the projection of the national population considering that the activity has reached maturity in terms of development (maximum percentages of population treated, volume of water treated, protein consumption, balance in treatment systems and maximum abstraction efficiencies for CH<sub>4</sub> generated and its utilisation).

The calculation of emissions has been done consistently with the methodologies used in the National Emissions Inventory (based on the IPCC Methodological Guidelines 2006 and EMEP/EEA 2019, usually with Level 2 methodological approaches).

### **Product Use Sector projections**

This sector mainly includes activities related to the use of lubricants and solvents (CRF activity 2D) and the use of fluorinated gases (CRF activities 2F and G).

The projection of the variables of activities linked to the use of lubricants and solvents has been linked by elasticities to the GDP and population projection determined in the overall macroeconomic context of the National Plan.

For F-gas emissions from refrigeration and air-conditioning activities, foaming agents, fire-fighting equipment have been projected in accordance with the F-gas Regulation UE/517/2014 targets that aim to reduce emissions in 2010 by 2/3 and F-gas sales in 2014 by 79 % by 2030.

The range of activities covered by category CRF 2G (SF6 in electrical and medical equipment, N<sub>2</sub>O in anaesthesia and assembled cream aerosols) has been planned by linking the activities directly to GDP.

No policies or measures beyond those currently in place have been taken into account for the construction of the scenario with additional measures.

The estimation of projected emissions has been done consistently with the methodologies used in the National Emissions Inventory (based on the IPCC Methodological Guidelines 2006 and EMEP/EEA 2019 and usually on Level 2 methodological approaches).

### **LULUCF projections**

Projections of removals and emissions from the land use, land use change and forest (LULUCF) sector have been made using the same calculation model as used in the 2023 edition of the National Emissions Inventory (1990-2021 series and base year 2021). This calculation system applies the IPCC 2006 methodological guidelines and makes use of data sets of surface uses and changes available from 1970 to 2021.

The land use change matrices from 2022 onwards have been constructed on the trends observed in the historical data. Only additional areas have been incorporated in the reforestation for the construction of the scenario with additional measures according to the measures described in the relevant chapter of this report.

Forecasts of consumption and use of wood products have been based on historical data relating to GDP. For crop transitions, the incidence of forest fires, the growth of forest biomass or the implementation of agricultural soil conservation practices (activities with a significant impact on estimates of emissions and removals in the LULUCF sector of the Spanish Inventory), different projection approaches have been applied in the future 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. MODEL DESCRIPTION DENIO**

The DENIO model has been used in this study to analyse the economic impact of the different measures and scenarios of the NECP. DENIO is a neo-Keynesian dynamic econometric input-output model. It is a hybrid of an econometric input-output model and a computable general equilibrium model (CGE). It is characterised by the inclusion of institutional rigidities and frictions which mean that fiscal policies and investments have differing impacts in the short term and 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 types and 16 categories of consumption. The model equations have been estimated econometric using data from the INE, the Bank of Spain and EUROSTAT.

DENIO is inspired by the European Commission's *FIDELIO (Fully Interregional Dynamic Econometric Long-term Input-Output Model)* model (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). Such a model has also been used in the Basque Country (DERIO: *Dynamic Econometric Regional Input-Output model*)<sup>81</sup> to analyse the economic impact of the Basque Country's 2050 Climate Change Strategy.

In DENIO, in the long term economic growth is motivated by total factor productivity (TFP) growth, with a corresponding price path and therefore competitiveness of exports. Exports are exogenous and adjusted in the baseline scenario to the GDP growth path provided by MINECO. Imports are endogenous and there is no balancing condition on the external balance.

There are two mechanisms in DENIO which give the model its Keynesian characteristics in the short term and CGE characteristics in the long term: (i) the heterogeneity of the marginal propensity to consumption with respect to disposable income, depending on the situation in the financial sector and (ii) the effect on wages/prices when the economy is in or below the equilibrium unemployment rate (NAIRU). The marginal propensity to consumption also varies according to income group. That assumption has been derived from estimates of the long-term sensitivity of consumption to income (Kratena, et al., 2017).

The household demand sub-model comprises three levels at which the demand of the 22.000 types of households is determined for a total of 16 categories of expenditure. At the first level there is demand for durable goods (dwellings and vehicles) and total demand for non-durable goods. The second level links energy demand (in monetary and physical units) to the stock of durable goods (houses, vehicles, domestic appliances), taking into account the energy efficiency of the stock. At the third level, nine categories of demand for non-durable consumer goods are identified in an *Almost Ideal Demand System*. Finally, the total expenditure by households of these 16 consumption categories (at purchasers' prices) is transformed into a consumption vector of 88 products at basic prices using a product/expenditure bridge matrix and the valuation matrices provided by the INE. The model is estimated using micro-data from the Household 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 destination drawn up by the INE. The production model links the production structures (Leontief technology) of the 74 sectors and 88 products to a Translog model with four production factors (capital, work, energy and the remaining intermediate inputs). The demand for the energy factor is divided into 25 types which in turn are linked to the model in physical units (Terajoules and tonnes of CO<sub>2</sub>). The set of energy categories in the energy substitution model is directly linked to two parts of the model: (i) the physical accounts (Terajoules) for energy by industry (74 + households) and type of energy (25) of Eurostat and (ii) the energy products and industries of the tables of origin and destination in monetary units. For that, a series of implicit prices are used that link energy uses/production in physical units (TJ) and in monetary terms. The high level of detail of the energy model makes it possible to link the DENIO model to bottom-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 productivity, the consumer price index and the distance to full employment. The demand for intermediate inputs is modelled in three steps. Firstly, the Translog model estimates the total demand for intermediates of each production sector. Secondly, this demand is broken down using the production structures in the Input-Output table of origin. Finally, the intermediate demand is divided into national 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 endogeneising 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 components of endogenous revenue: taxes on income (at rates varying according to the income of each household), on wealth, on capital, on products and on 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 TIMES-Sinergia bottom-up model. Specifically, data such as the energy and electricity mix, intensity and energy efficiency by sector, prices and investments are taken from that model in order to analyse the economic impact 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 hold heating applications. Analysis of scrappage policy scenarios. European Com- mission, Joint Research Centre, Institute for Prospective Technological Studies. ISBN 978-92-79-50850-9.

Kratena, K., Streicher, G., Salotti, S., Sommer, M., Valdera Jaramillo, J.M. 2017. FIDELIO 2: Overview and theoretical developments of the second version of the Fully Interregional Dynamic Economised Long-term Input-Output model for the EU-27. European Commission, Joint Research Centre, Institute for Prospective 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 entire Spanish population, which makes it possible to assess microeconomic effects and distributional impacts and their social impact.

The main database used to integrate the 22.000 households into the model is the Household Budget Survey (EPF). This is a representative cross-sectional survey of the entire Spanish population. It collects annual information on consumption patterns and socio-economic characteristics of Spanish households. Thus, the consumption structure of the EPF includes the households collected from that 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 micro-data in such a model is not immediate and it has been necessary to include data from other statistical sources and to make 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 monthly household incomes, this variable has a high non-response rate and as shown by some studies, household income is often under-represented. (2016). Therefore, in order to calculate the income of each household, the estimated savings calculated for Spain were applied to the total expenditure of each household. Estimated savings were selected to be used for income level for two reasons. Firstly, the Household Budget Survey was used to calculate them. The second reason is that estimated household savings are presented by different levels of income, specifically by quintiles. Thus, using the savings rates per income quintile in the EPF, the structure of inequality in Spain is respected.

Finally, it was also necessary to estimate the source of income of the households included in the model. 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 various sources. The following 8 sources of income are taken into account in DENIO when calculating household disposable income: (1) wages and salaries; (2) gross operating surplus; (3) social contributions; (4) transfers from the public sector; (5) property income and dividends; (6) interest paid on the debt; (7) taxes on wealth and personal income and (8) other income. Such information is not included in the Household Budget Survey. For this reason, the sources for the origin of household incomes were complemented with information from the Living Conditions Survey. This survey, like the Household Budget Survey, is a representative cross-sectional survey of the whole of the Spanish population. Its basic purpose is to provide a reference source of comparative statistics for the distribution of income and social exclusion in the European context (INE 2018b).

In order to complement the income sources in the Household Budget Survey, the income structure of the 2014 Living Conditions Survey was calculated by income group, more specifically by income bracket, taking into account the income sources included in DENIO. Following calculation of the average structure of income sources per income bracket of the Living Conditions Survey, the same structures were applied to the households in the Household Budget Survey according to the income bracket of each household.

The above process produced the following information for each household included: consumption patterns, total income, origin of these incomes and characteristics included in the Household 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). Continuous Household Budget Survey, base 2006. National Institute of Statistics. [www.ine.es](http://www.ine.es)

INE (2018b). Living conditions survey, base 2013. National Institute of Statistics. [www.ine.es](http://www.ine.es)

Sulpez-Laborta, J., Marín-González, C. and Onrubia, J. (2016). What has happened to consumption and savings in Spain during the Great Recession: An analysis by household type, *Studies on the Spanish economy*, 2016/20, Fedea.

### 8.3.3. SPECIFICATION OF THE AIDS DEMAND MODEL

For the specification of the nondurables cluster, a demand model was estimated in order to calculate the price elasticities of substitution, as well as the income elasticities in terms of the various goods that make up this cluster. These elasticities were subsequently used to apply parameters corresponding to the demand for nondurables function. For the estimation of the demand model for these goods, the widely known ‘AIDS System’, proposed in 1980 by Deaton and Muellbauer (1980), has been used. The main advantage of this methodology is that it allows a first order approximation to an unknown demand system. Furthermore, AIDS models comply with the tenets of consumer theory and do not impose restrictions on the utility function. More specifically, the logarithmic form (LAIDS) was used, which can be defined for a specific group of goods  $n$  as:

$$W_i = \alpha_i + \sum_{j=1}^N \gamma_{ij} \ln p_j + \beta_i \ln (Y/p) + t + \sum_{d=1}^D \delta_d + \epsilon_{it} \quad [1]$$

where  $W_i$  represents the percentage of consumption of good  $i$  (over the total consumption of goods included),  $\alpha_i$  is the constant,  $p_j$  is the price of good  $j$ ,  $Y/p$  refers to the Stone price index,  $Y$  is income (so  $Y/p$  represents the actual income),  $t$  is a trend variable that captures the effect of time (taking values of 1 for 2006 and 11 for 2016). Finally  $d_d$  is a set of “ $d$ ” dummies or control variables capturing the effect of different characteristics of households included: crisis years (meaning years post or pre 2008); autonomous Community of residence; professional status of main provider; number of members of the household; gender of the principal parent; age of main provider and proximity to urban centre. Finally,  $\epsilon_{it}$  is the term of error. The additivity and homogeneity of the equation [1] are as follows:

$$\sum_{i=1}^N \alpha_i = 1 \quad [2]$$

$$\sum_{j=1}^N \gamma_{ij} = 0 \quad [3]$$

$$\sum_{i=1}^N \beta_i = 0 \quad [4]$$

The symmetry condition is given as:

$$\gamma_{ij} = \gamma_{ji} \quad [5]$$



Finally, the sum of  $W_i$  must also satisfy that:

$$\sum_{i=1}^N W_i = 1 \quad [6]$$

The AIDS model is used to analyse demand for non-durable goods, including 9 different groups of 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) hotel and restaurant services; (8) financial services and (9) Other non-durable goods. As the AIDS model consists of a system of dependent equations, the equation corresponding to group 9 was eliminated in the estimation process in order to avoid issues of singularity. The elasticities matrix of the AIDS model was calculated using the following expressions:

Price-own Marshalliana elasticity:  $\epsilon_{ii} = \frac{p_i}{W_i} - 1$  [7]

Price-cross Marshalliana elasticity:  $\epsilon_{ij} = \frac{\text{in the case of a person}}{W_i} - \beta_i$  [8]

Income elasticity:  $\eta_i = \frac{1}{W_i} + 1$  [9]

The data used in the estimation process were taken from the microdata in the Household Budget Survey (INE, 2018). The survey is a representative cross-sectional survey of all Spanish households. It collects annual information on consumption patterns and socio-economic characteristics of households. It collects annual information from some 20.000 households. For the AIDS estimation, data from the Household Budget Survey were used for the period 2006 to 2016. One of the main limitations of the estimate is the lack of an ongoing household survey. The Household Budget Survey is a cross-cutting survey for each year. For this reason, cross data from each year were used in the estimation, meaning that data were not converted into a continuous time series. In the estimation of equation [1], household expenditure is used as a proxy for income due to household incomes being underrepresented in expenditure surveys (see for example Wadud et al., 2009, or que se pez-Laborta et al. 2018) and also because expenditure is a variable closer to permanent living income and is less varied over the life of individuals (Poterba, 1991). Given that the groups of expenditure analysed comprise different goods and products, national statistics do not include specific prices for the groups selected. For this reason, it was necessary to create a price index per group based on the consumer price indices (INE 2018) for each expenditure sub-group. For this purpose, a Stone price index was created for each expenditure group using on the basic price indices per Autonomous Community from 2006 for each sub-group. One of the main advantages of this process is that it allows heterogeneity to be included in the prices of each group of expenditure and individual expenditure. In this way, it facilitates the estimate of the AIDS model.

The price and income elasticities obtained are shown in Table B.4. The final column of the table shows income elasticities, which the other columns show price elasticities. The main diagonal of the matrix, in the darker shade, shows the own price elasticities, while the other elements are cross prices.

As can be seen, and was to be expected, the own price elasticities have a negative sign, while the income elasticities are positive.

**Table B.4. Price elasticities (own and cross) and income elasticities**

	Nutrition	Textile	B_Hogar	Health;	Communications	Education	Restoration	Serv_Financiers	Other	Income
Nutrition	− 1.76	0.83	0.39	0.89	− 0.08	− 0.09	0.69	0.13	− 0.65	0.58
Textile	2.71	− 2.29	− 1.27	− 1.36	0.27	0.71	− 0.45	− 0.32	0.72	1.34
B_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
Serv_Financiers	− 0.07	− 0.36	0.25	0.26	0.47	0.28	− 0.58	− 0.59	− 0.51	0.74
Other	− 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

## Bibliographic references

Deaton, A. and Muellbauer, J. (1980): An almost Ideal Demand System. *American Economic Review*, 70, 312 – 326.

Hills, J., 2012. Getting the measurement 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 Political Science., London, UK.

Sulpez-Laborta, J., Marín-González, C. and Onrubia, J. (2016). What has happened to consumption and savings in Spain during the Great Recession: An analysis by household type, *Studies on the Spanish economy*, 2016/20, Fedea.

Poterba, J.M. (1991). Is the Gasoline Tax Regressive? National Bureau of Economic Research.

Herrero, S., Jiménez Meneses, L., López Fernández, J.L., Perero Van Hove, E., Irigoyen Hidalgo, V., Savary, P., (2016). Poverty, vulnerability and energy inequality. New approaches to analysis. Association of Environmental Sciences, Madrid.

Herrero, S., Jiménez Meneses, L., López Fernández, J.L., Perero Van Hove, E., Irigoyen Hidalgo, V., Savary, P., (2018). Energy poverty in Spain. Towards a system of indicators and a strategy for state action. Association of Environmental Sciences, Madrid.

Wadud, Z., Graham, D. J. and Noland, R.B. (2009). Modelling fuel demand for different socio-economic groups, *Applied Energy*, 86, 2740 – 9.

### 8.3.4. DESCRIPTION OF TM5-FASST

TM5-FASST is a global air quality ‘fuente-receiver’ model (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. Using meteorological or chemical-atmospheric information, the model analyses how emissions from a given source affect 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 conduct various studies at global and regional level including Kitous et al., (2017) and Markandya et al., (2018). It has also been used by institutions such as the OECD for future projection of the potential health effects (OECD, 2016).

The concentration levels of a given pollutant will be calculated using the following linear equation:

$$C_{ij}(x, y) = c_j(y) + A_{ij}(x, y) E_i(x) \quad (1)$$

In this equation, the concentration level of a pollutant j in the receptor/cell y resulting from the emission i emitted at source x, ( $C_{ij}(x, y)$ ) is defined as the sum of a spatial constant ( $c_j$ ) plus

the emission of the precursor  $i$  at source  $x$ , multiplied by a source-receptor coefficient ( $A_{ij}(x, y)$ ) which reflects the relationship between the source  $x$  and receptor  $y$ .

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  $1^\circ \times 1^\circ$  ( $\sim 100$  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:

$$A_{ij}(x, y) = \frac{C_j(y) - CSDP_j}{E_i(x)} \quad (2)$$

Where  $E_i(x) = 0.2 \cdot e_i(x)$ , and  $e_i(x)$  is the emissions in the baseline scenario.

It should be borne in mind that in addition to the fact that gases emitted at a certain source  $x$  may affect different receptors and, each precursor may also indirectly affect concentration levels of more than one pollutant  $j$ . For example, emissions of  $\text{NO}_x$  (which is a precursor gas) not only affect the formation of particulate matter  $\text{PM}_{2.5}$  in the atmosphere, but also influence ozone ( $\text{O}_3$ ) levels.

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:

$$C_j(x, y) = c_j(y) + \sum_x A_{ij}(x, y) [E_i(x) - e_i(x)] \quad (3)$$

Once the concentration levels of the pollutants have been ascertained, the model makes it possible to analyse different effects arising from these levels. These include the impacts of pollution on health, potential harm to agricultural systems and depositions in the Arctic. However, this study focuses on the effects that concentration levels of fine particulates ( $\text{PM}_{2.5}$ ) and ozone have on human health.

These effects are calculated as premature deaths resulting from exposure to these pollutants ( $\text{PM}_{2.5}$  and  $\text{O}_3$ ), taking into account the different causes defined in Forouzanfar et al., 2016a, including cardiovascular, respiratory, embolism or lung cancer. The parameters and calculation of premature deaths due to disease are explained in Burnett et al., 2014.

### **Bibliographic references**

Attademo, L., Bernardini, F., 2017. Air pollution and urbanicity: common risk factors 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., 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 Function for Estimating the Global Burden of Disease Attributable to Ambient Fine Particulate Matter Exposure. *Environ. Health Perspect* <https://doi.org/10.1289/ehp.1307049>

Forouzanfar, M.H., Afshin, A., Alexander, L.T., Anderson, H.R., Bhutta, Z.a., Biryukov, S., Brauer, M., Burnett, R., Cercy, K., Charlson, F.J., others, 2016a. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, 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 Pollution*, 2016. OECD Publishing.

Searl, A., Ferguson, J., Hurley, F., Hunt, A., 2016. *Social Costs of Morbidity Impacts of Air Pollution* (OECD Environment Working Papers No. 99).

Van Dingenen, R., Dentener, F., Crippa, M., Leitao-Alexandre, 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 shortened climate pollutants.

# ANNEX C. MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN

**Table C.1. Summary table of the main elements of the fight against climate change in Spain**

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
<b>CROSS-SECTORAL POLICIES AND MEASURES</b>						
Operational programmes of the Autonomous Communities	Intersectorial	Regional development and emission reduction, especially in Thematic Objective 4 <i>"Fostering the shift towards a low-carbon economy in all sectors"</i>	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR HFCS	EC	I	2014
Climate projects	no ETS	Reducing emissions in diffuse sectors and encouraging the development of low-carbon economic activity.	GHG	EC	I	2012
Carbon footprint register, compensation and CO <sub>2</sub> absorption projects	Intersectorial	Promote carbon footprint calculation by Spanish organisations.	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR HFCS	I	I	2014
Operational Programme for Sustainable Growth 2014-2020	Intersectorial	Sustainable growth under the ERDF. Highlighting low-carbon economy measures, integrated and sustainable urban development, water quality and sustainable transport	CO <sub>2</sub>	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 sectoral emission allocation ceiling. Objective: Achieve a 62 % reduction in EU ETS emissions by 2030 compared to 2005 (EU) levels.	GHG	EC	I	2005
Carbon capture and storage (CCS) European Directive	Intersectorial	Regulations on environmentally safe geological storage of CO <sub>2</sub> to contribute to the fight against climate change.	CO <sub>2</sub>	N	A	2009
Financing of demonstration projects. NER300 programme	Intersectorial	Promotion of the construction of CO <sub>2</sub> capture and geological storage <sup>projects</sup> and innovative renewable energy technologies in the territory of the EU. With 38 projects up to 2014.	CO <sub>2</sub>	R &A MP; I	D	2010
Strategic projects for economic recovery and transformation (PERTE)	Intersectorial	Strategic projects to promote economic growth, employment and the competitiveness of the Spanish economy, including several sectors focused on sustainability and decarbonisation.	GHG	EC R &A MP; I	P	2021
National Air Pollution Control Programme	Intersectorial	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 from 2030 onwards.	So <sub>2</sub> NO <sub>x</sub> NH <sub>3</sub> Other	P	I	2020
National Climate Change Adaptation Plan (PNACC) 2021-2030		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
Long-term Decarbonisation Strategy	Intersectorial	Pathway to reaching climate neutrality by 2050	GHG	P	I	2020
Fair transition strategy	Intersectorial	Maximising employment opportunities and minimising the impacts of the energy transition	GHG	P, N	I	2019
Law 7/2021 on Climate Change Energy Transition	Intersectorial	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

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
<b>SECTORAL POLICIES AND MEASURES</b>						
<b>Energy sector</b>						
Energy Diversification and Saving Investment Fund – F.I.D.A.E	Energy Other	It aims to finance sustainable urban development projects that improve energy efficiency or use renewable energy.	CO <sub>2</sub>	EC	E	2011
Action Plan on Savings and Efficiency 2014-2020	Energy Other	Achieving final energy savings for the period 2014-2020	CO <sub>2</sub>	P	I	2014
Electricity and Gas Sector Planning 2014-2020	Energy	Meet the 2020 targets for energy efficiency, renewable energy and the environment.	CO <sub>2</sub>	P	I	2014
Renewable Energy Plan (REP) 2011-2020	Energy Other	Promoting renewable energy consumption.	CO <sub>2</sub>	P	I	2011
<b>Industrial sector</b>						
Voluntary agreement SF6 – Electricity sector	Industrial	Reduction of F-gas emissions.	SF <sub>6</sub>	AV	I	2015
Royal Decree 115/2017 on fluorinated gases	Industrial	Reduction of F-gas emissions.	PFC SF <sub>6</sub> , HFCS	N	I	2017
National tax on fluorinated greenhouse gases	Industrial	Replace fluorinated gases with other substances; Reduction of F-gas emissions.	PFC SF <sub>6</sub> HFCS	F	I	2014
IPPC Integrated Pollution Prevention and Control	Industrial	Integration of environmental authorisations for industrial activities.	GHG	N	I	2003
BREF documents	Industrial	Description of Best Available Techniques for Emission Reduction in each industrial sector	GHG	N	I	2010
PRTR Component 12: Spanish Industrial Policy 2030	Industrial	The main challenges faced by industry and addressed by this component are: (I) data-driven digital transformation in the field 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 management, emissions and renewable energy under the circular economy.	GHG	P	I	2021
PERTE Industrial Decarbonisation	Industrial	Support industry in its transition towards more environmentally-friendly models and processes and contribute to the 2050 climate neutrality objective	CO <sub>2</sub>	P	I	2022
<b>Transport Sector</b>						
Safe, Sustainable and Connected Mobility Strategy 2030	Transport	Axes and measures for the decarbonisation of mobility, infrastructure and transport	GHG	N, P	I	2021
ADIF Climate Change Blueprint 2018-2030 — High speed	Transport	Measures to save energy and improve energy efficiency at high speed.	CO <sub>2</sub>	N, P	I	2018
RENFE Energy Sustainability Plan 2011-2020	Transport	Management tool to improve energy efficiency and productivity.	CO <sub>2</sub>	N, P, I	I	2011
Energy Efficiency Plan 2015-2025 RENFE Viajeros	Transport	Reduce energy consumption and costs.	CO <sub>2</sub>	N, P	I	2015
Eco-incentive subsidies in rail freight transport	Transport	Development and use of rail services with proven environmental merits	GHG	EC	P	2022
Action Plan on CO <sub>2</sub> Emission Reduction of the International Air Sector in Spain	Transport	Measures for the sustainability of the aviation sector	CO <sub>2</sub>	P	I	2021
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

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
Emission reports produced in the preceding year each aircraft operator subject to emissions trading	Transport	Monitoring of emissions produced by each airline	CO <sub>2</sub>	I	I	2018
Emission Improvement Reports for each aircraft operator	Transport	Improvement measures to reduce emissions for each operator	CO <sub>2</sub>	I	I	2018
Aerospace PERTE	Transport	Generating a new space technology programme providing services related to the environment and territorial cohesion	CO <sub>2</sub>	P	I	2022
Climate Action Plan 2021-2030 AENA: Heading Zero Emissions	Transport Energy	Own (direct and indirect) and third party emission reduction measures	CO <sub>2</sub>	AV	I	2021
Framework Agreement for the design, supply or installation of energy-efficient lighting systems	Transport Energy	Improvements in the efficiency of airport lighting systems.	CO <sub>2</sub>	AV	I	2015
Second framework agreement for efficient lighting	Transport Energy	Improvements in the efficiency of airport lighting systems.	CO <sub>2</sub>	AV	I	2017
Carbon footprint accreditation at airports	Transport	Obtaining and renewing carbon accreditation at several airports.	CO <sub>2</sub>	AV	I	2011
400 Hz electricity supply to aircrafts at airports	Transport Energy	Boosting the use of electricity for stationary aircraft.	CO <sub>2</sub>	P	I	2016
Phasing in renewable energy in airports	Transport Energy	Using alternative energy sources and diversifying energy production at airports.	CO <sub>2</sub>	Other	I	2000
Optimisation of aircraft taxiing movements	Transport	Minimise aircraft times and journeys at the airport.	CO <sub>2</sub>	AV	I	2014
Fuel reduction during flight, approach and landing	Transport	Optimise trajectories to enable safer, more cost-effective and sustainable operations	CO <sub>2</sub>	R & I	P	2022
Redesign and manufacture of most efficient aircraft components	Transport	Use of smart technologies for the design and manufacture of components such as wings.	CO <sub>2</sub>	R & I	P	2021
Renewal of fleets of heavy goods and passenger vehicles and agricultural tractors	Transport	Finance the replacement of heavy goods vehicles of companies (fewer than 3.000 employees).	CO <sub>2</sub>	EC	I	2016
Programme for the conversion of fleets of professional heavy goods vehicles by road	Transport	Boosting the decarbonisation of professional road transport (heavy-duty vehicles)	CO <sub>2</sub>	EC	I	2021
Invitation to tender for concessions for regular road passenger transport	Transport	Establish energy efficiency and pollutant requirements in concession documents.	CO <sub>2</sub>	N	I	2014
Incorporation of criteria promoting the use of less polluting ground handling equipment	Transport	Encouraging the use of less polluting equipment.	CO <sub>2</sub>	Other	I	2015
Aid for the establishment of vehicle fleet management systems	Transport	Introduction of efficient fleet management systems.	CO <sub>2</sub>	EC	I	2015
Aid for the financing of urban mobility plans and business mobility plans	Transport	Development of urban mobility plans (modal shift)	CO <sub>2</sub>	EC	I	2014
Efficient Vehicle Incentives PLANES PIVE (PIVE I, II, III, IV, V, VI, VII and VIII)	Transport	Renewal of the fleet of light duty vehicles by more efficient vehicles.	CO <sub>2</sub>	EC	E	2012
Efficient driving courses in road transport	Transport	Efficient driving in road transport.	CO <sub>2</sub>	ED	I	2015

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
Training for Digital Skills and Sustainability in Transport and Mobility	Transport	Training actions for the acquisition and improvement of professional skills for sustainability in transport and mobility	CO <sub>2</sub>	ED	I	2022
Integrated Strategy for the Promotion of Electric Vehicles in Spain and Plans MOVELE and MOVEA (since 2016)	Transport	Encouraging the penetration of electric vehicles, aimed at promoting alternative technologies.	CO <sub>2</sub>	EC	E	2010
MOVES Mobility, Efficiency and Sustainable Incentives Programme (I, II and III) and MOVES Flotas	Transport	Incentivising electric mobility through the purchase of electric vehicles and the deployment of charging infrastructure	CO <sub>2</sub>	EC	I	2019
PERTE for the development of the electric and connected vehicle	Transport	Creating the ecosystem necessary for the development and manufacturing of electric and connected vehicles	CO <sub>2</sub>	P	I	2021
Environmental Promotion Plan – PIMA Transport	Transport	Renewal of the road transport fleet.	CO <sub>2</sub>	EC	E	2014
Plan to Impress the Environment PIMA Air Plans (I, II, III and IV)	Transport	Renewal of the commercial vehicle fleet.	CO <sub>2</sub>	EC	E	2013
Royal Decree 1085/2015, of 4 December, on the promotion of biofuels	Transport	Establish the pathway for the introduction of biofuels in transport by 2020.	CO <sub>2</sub>	N	I	2017
Royal Decree 376/2022 on the sustainability of biofuels, bioliquids and biomass fuels	Transport	Establish sustainability and GHG emissions saving criteria for biofuels, bioliquids and biomass fuels	CO <sub>2</sub>	N	I	2022
Management and service delivery programme	Transport	Resource efficiency and rationalisation.	CO <sub>2</sub>	P	I	2012
Investment Action Programme	Transport	Infrastructure planning with an intermodal approach, enhancing the most efficient way on each corridor.	CO <sub>2</sub>	P	I	2012
Regulatory, control and supervisory programme	Transport	Enable the development and implementation of established policies in each of the modes of transport.	CO <sub>2</sub>	N	I	2012
Logistics Strategy of Spain	Transport	Boosting the Spanish logistics sector, improving the efficiency and sustainability of the transport system, and developing an intermodal network.	CO <sub>2</sub>	N, P	I	2013
Promoting urban mobility plans	Transport	Local authorities to approve mobility plans.	CO <sub>2</sub>	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 <sub>2</sub>	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 <sub>2</sub>	P	I	2021
Aid for the establishment of low-emission zones and the transformation of urban transport.	Transport	Creating low-emission zones and the digital and sustainable transformation of urban transport	CO <sub>2</sub>	EC	I	2021
Transport voucher	Transport	Promotion of collective employee transport.	CO <sub>2</sub>	F	I	2010
Registration tax: Law 38/1992 of 28 December 1992 on excise duties	Transport	Tax levied on the basis of the level of CO <sub>2</sub> emissions.	CO <sub>2</sub>	F	I	2008
National Action Framework for Alternative Energy in Transport	Transport	Promotion of alternative fuels in transport by 2020.	CO <sub>2</sub>	N	I	2017
Categorisation of the vehicle fleet according to the level of emissions	Transport	Identify the category of vehicles for municipalities may develop policies environmental.	CO <sub>2</sub>	N	I	2015
Efficient driving: Order INT/2229/2013, Regulating access to registration certificates	Transport	Include efficient driving in the driving licence programme.	CO <sub>2</sub>	ED	I	2014
Amendment of the General Traffic Regulation	Transport	It amends the general speed limits set for vehicles on different road types.	CO <sub>2</sub>	N	I	2020
Motorways of the Sea	Transport	Modal shift in road freight to ship.	CO <sub>2</sub>	P	I	2010
Efficiency measures in port management	Transport	Efficient use of the general street lighting service in ports.	CO <sub>2</sub>	AV	I	2016
Port Accessibility Investment Plan	Transport	Promote port connectivity and maritime/rail intermodality.	CO <sub>2</sub>	P	I	2017



MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
Liquefied natural gas (LNG) supply in ports	Transport	Boosting the use of LNG in maritime transport.	CO <sub>2</sub>	N, P I & AMP;	I	2016
Electricity supply to ships at berth in ports	Transport Energy	Encouraging the use of electricity for use by vessels at berth in ports.	CO <sub>2</sub>	EC	I	2016
PERTE for the shipbuilding industry	Transport	Improving the environmental sustainability of the sector	CO <sub>2</sub>	P	I	2022
Eco-incentive subsidies in maritime transport	Transport	Development and use of proven maritime transport services in the environmental field	GHG	EC	P	2022
Residential, Commercial and Institutional Sector (RCI)						
Environmental Promotion Plan to promote the energy renovation of hotel facilities PIMA Sol	RCI	Stimulate the energy renovation of hotel facilities.	CO <sub>2</sub> and NO <sub>x</sub>	EC	E	2013
Action Plan for the Environment to promote and support climate change in urban and interurban areas. PIMA Climate Change	RCI	Stimulate the implementation of innovative pilot actions and the drafting of technical projects and reports in urban and inter-urban areas.	CO <sub>2</sub>	EC, R & I	E	2022
Tourism Facility Renovation Plans	RCI	Renovation and upgrading of tourist establishments under sustainability and energy efficiency criteria.	CO <sub>2</sub>	EC	I	2009
State Financial Fund for Tourism Competitiveness	RCI	Promote, by means of loans, the improvement of the competitiveness of the tourism sector, in particular projects involving the digitisation of tourist destinations, and innovation and modernisation of services.	CO <sub>2</sub>	EC	I	2021
Rehabilitation of buildings in the General State Administration	RCI	Energy renovation of the building stock.	CO <sub>2</sub>	P	I	2015
PRTR Component 11: Modernisation of public administrations	RCI	Promoting energy savings and efficiency and promoting the use of energy from renewable sources in buildings and infrastructure.	CO <sub>2</sub>	EC	I	2021
Regulations for Thermal Installations in Buildings (RITE)	RCI	Increase the minimum energy performance requirements for thermal and air-conditioning installations in buildings.	CO <sub>2</sub>	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 energy.	CO <sub>2</sub>	EC	I	2013
Technical Building Code (CTE)	RCI	Increased demands on energy efficiency and the incorporation of renewable energy.	CO <sub>2</sub>	N	I	2013
Law 8/2013 on Urban Renovation, Regeneration and Renewal	RCI	Facilitate the approval of projects for energy renovation of buildings and urban regeneration.	CO <sub>2</sub>	N	I	2013
State Housing and Rehabilitation Plan and State Plan to Promote Rental, Building Rehabilitation, Urban Regeneration and Renovation (2013-2016)	RCI Energy	Improvement of the thermal envelope, air conditioning systems, installation of renewable energy and energy efficiency.	CO <sub>2</sub>	P	I	2013
State Housing Plan 2018-2021	RCI Energy	Contributing to employment, growth, the competitiveness of the economy and environmental sustainability.	CO <sub>2</sub>	P	I	2018
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 socially rented housing in energy-efficient buildings	CO <sub>2</sub>	P	I	2022
Component 2: Housing rehabilitation and urban renewal plan	RCI Energy	Promote the energy renovation of the built stock in Spain and the increase in the social rental housing stock	CO <sub>2</sub>	P	I	2021
Energy Certification of New and Existing Buildings	RCI Energy	Royal Decree 390/2021 of 1 June 2007 approving the basic procedure for the certification and improvement of the energy performance of buildings and dwellings.	CO <sub>2</sub>	N	I	2021
Agricultural sector						
Maritime and Fisheries Operational Programme	Agricultural	Several measures contribute to Thematic Objective 4 "Fostering the shift to a low-carbon economy in all sectors".	CO <sub>2</sub>	E	I	2014

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S Year I.	
Plan to promote the environment – PIMA Earth (renewal of tractor fleet)	Agriculture I	Renewal of the tractor fleet by more efficient and less emitting tractors.	CO <sub>2</sub>	EC	E	2014
Efficient driving of tractors	Agriculture I	Reduction of emissions due to good driving practices.	CO <sub>2</sub>	ED	I	2014
Royal Decree 448/2020, of 10 March, on the characterisation and registration of agricultural machinery	Agriculture I	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 and environmental protection standards.	CO <sub>2</sub>	N	I	2020
National Programme for the Promotion of Crop Rotations on Sectoral Land	Agriculture I	Reduce emissions through further optimisation of resource use and best practices.	N <sub>2</sub> OR CO <sub>2</sub>	EC	E	2010
Strategy to support organic production	Agriculture I	Promotion of measures that can contribute to the development of organic production.	N <sub>2</sub> OR CO <sub>2</sub>	P	I	2014
Greening or Green Payment	Agriculture I	Payment for agricultural practices beneficial for the climate and the environment (crop management, improvement of biodiversity, carbon sequestration).	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	EC	I	2015
Plan for Reducing the Use of Nitrogen Fertilisers	Agriculture I	Reducing the use of nitrogen fertilisers and thus reducing emissions, either during their manufacture or application in the field.	N <sub>2</sub> OR	ED	I	2007
National Programme for Rural Development (NRDP) 2021-2022	Forestry Agriculture	Prevention and restoration after large fires, conservation of forest genetic resources, conservation of forest carbon.	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	P	I	2015
Rural Development Programmes by Autonomous Communities 2014-2020	Forestry Agriculture	Reduction of emissions by different measures: crop, grassland, soil and livestock management, reduced fertilisation, forest carbon conservation, forest management and prevention of deforestation.	CO <sub>2</sub> N <sub>2</sub> OR CH <sub>4</sub>	P	I	2014
Royal Decree-Law 4/2022 of 15 March 2007 adopting urgent measures to support the agricultural sector due to drought	Agriculture I	The purpose of this Royal Decree-Law is to establish support measures for the owners of agricultural holdings so as to help restore the profitability of those farms, which have been severely affected by the drought situation.	CO <sub>2</sub> N <sub>2</sub> OR CH <sub>4</sub>	N	I	2022
Common Agricultural Policy Strategic Plan (CAP)	Forestry Agriculture	It contributes to climate change mitigation and adaptation, promotes sustainable development and efficient management of natural resources and contributes to the protection of biodiversity.	CO <sub>2</sub> N <sub>2</sub> OR CH <sub>4</sub>	P	I	2022
Royal Decree 1051/2022, of 27 December, establishing standards for sustainable nutrition in agricultural soils.	Agriculture I	It lays down basic rules for achieving a sustainable nutrient supply in agricultural soils.	N <sub>2</sub> OR CO <sub>2</sub>	N	A	2022
PERTE Agri-food	Agriculture I	It aims to promote the integrated development of the entire agri-food chain through the digitalisation of processes and the incorporation of knowledge and innovation.	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	P	I	2022
Water Cycle Digitalisation PERTE	Agriculture I	It will transform and modernise water management systems, both for the urban water cycle, irrigation and industrial uses. It will improve efficiency, reduce losses in water supply networks and thus save water and energy consumption.	CO <sub>2</sub>	P	I	2022
PRTR Component 3: Green and digital transformation of agri-food and fisheries industries	Agriculture I	The actions under 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 <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	P	I	2021
<b>Forestry sector</b>						
Initiative 4 per thousand for increasing soil organic carbon and food security	Forestry Agriculture	Increase the organic carbon content of soils.	CO <sub>2</sub>	P	P	2017
Restoration of forest cover and extension of woodland	Forestry	Afforestation.	CO <sub>2</sub>	N, P	I	1990

MAIN ELEMENTS OF THE FIGHT AGAINST CLIMATE CHANGE IN SPAIN						
Designation	Sector (s)	Objective or activity concerned	GHG	I	S	Year I.
Sustainable Forest management	Forestry	Sustainable forest management.	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	N, P	I	1990
PRTR Component 4: Ecosystems and biodiversity conservation and restoration	Forestry	It aims to achieve good conservation status of ecosystems through their ecological restoration when needed, and to reverse biodiversity loss, ensuring a sustainable use of natural resources and the preservation and enhancement of their ecosystem services.	CO <sub>2</sub> CH <sub>4</sub> N <sub>2</sub> OR	P	I	2021
Waste sector						
Plan to promote the environment PIMA Waste	Waste	Promote the collection and treatment of organic matter, the capture of biogas and its use.	CH <sub>4</sub> N <sub>2</sub> OR	EC	E	2015
Strategy "More food, less waste"	Waste	Reduction of food waste.	CH <sub>4</sub> N <sub>2</sub> OR	I	I	2013
State Waste Framework Plan 2016-2022	Waste	Implement waste management hierarchy.	CH <sub>4</sub> N <sub>2</sub> OR	P	A	2016
State inspection plan for transboundary shipments of waste 2021-2026	Waste	Ensuring and strengthening compliance with the rules on shipments of waste	CH <sub>4</sub> N <sub>2</sub> OR	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 management of their waste, as well as the legal regime for the prevention, production and management of waste.	CH <sub>4</sub> N <sub>2</sub> OR	N	I	2022

I = AV, voluntary agreement; EC, economic; Ed, education; F, public prosecutor; I, information system; R & I, research, development and innovation; N, normative; M, market; P, Plans and programmes

S = A, adopted; I, implemented; P, planned; E, expired (if still taking effect)

S.D. indicates no data, **non-quantifiable N.C.**, and **I.O.** integrated at another level

Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

## ANNEX D. SPAIN'S ELECTRICITY GRID REPORTS

The analysis of the scenarios defined for the Spanish system consists of simulating the dispatch of generation and the guarantee of supply for the adequacy analysis in the Spanish mainland system by 2030.

This annex is structured as follows:

- D.1 Generation dispatch studies for the PNIEC 2023-2030 scenario.
- D.2 Probability studies of security of supply under the PNIEC 2023-2030 scenario.

### **D.1. GENERATION DISPATCH STUDIES FOR THE 2023-2030 PNIEC SCENARIO, IN HORIZON 2030**

The purpose of this document is to show the results of the generation dispatch of the 'PNIEC 2023-2030' scenario updated by MITECO for the 2030 horizon.

It also includes a brief description of the methodology and model used, as well as the adaptation of assumptions from the national scenarios defined by MITECO for use in the European-wide study model. For more details regarding the simulation tool used, see Annex B.

#### **Methodology**

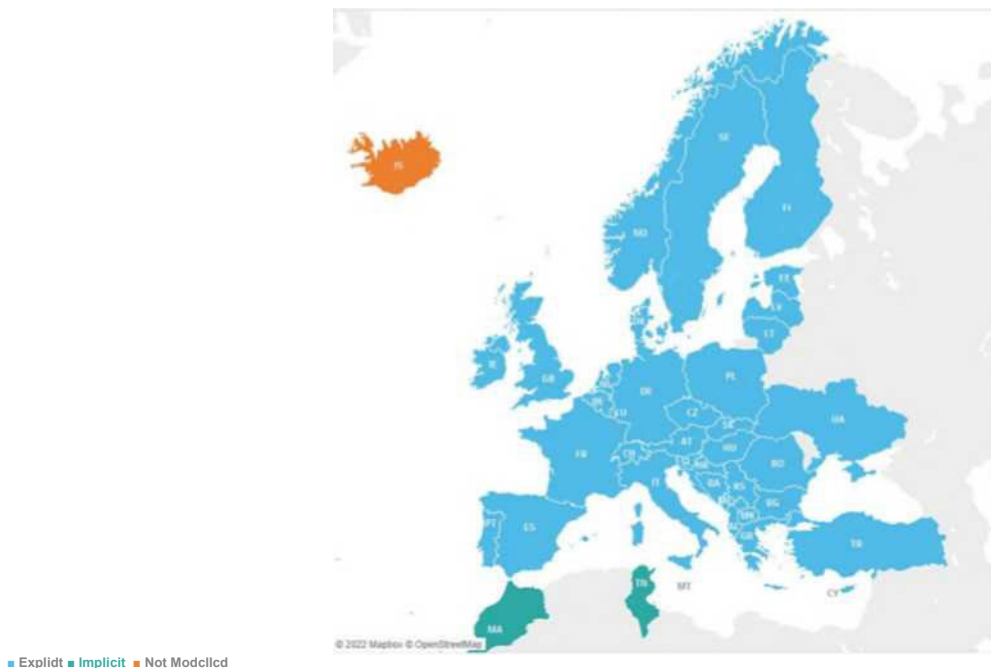
The analysis of the scenarios defined for the Spanish system consists of simulating the dispatch of generation and the guarantee of supply for the adequacy analysis in the Spanish mainland system under the assumptions to be described below and in a similar way to the studies carried out in ENTSO-E for the preparation of analyses at European level.

This analysis is based on a European-level model used in the framework of ENTSO-E. This model is the basis for both energy balance studies and 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 unexplicitly modelled. Explicitly modelled ones are represented by market nodes that consider complete information using the best available input data resolution and for which the UCED problem is solved. For explicitly unmodelled areas, fixed exogenous energy exchanges with explicitly modelled areas are applied.

The graph below shows the countries that have been explicitly modelled in blue, neighbouring countries that have been implicitly modelled, i.e. by fixed exchanges (green) and non-modelled countries (orange).

**Figure D.1. European environment under consideration. Fountain. ENTSO-E**



Source: Red Eléctrica de España

A simplified system model is used where the different modelled systems (bidding zones) are represented as a network of interconnected nodes by the commercial trading capacity available to the market (NTC) depending on the physical interconnections between them. In general, the model uses hourly trading capacity (NTC) values between modelled systems.

This is equivalent to the fact that within each bidding zone the generation dispatch calculation considers a single hub, i.e. any generation constraints due to internal network elements of each system are not taken into account. It is important to stress that this assumes in the model that the transmission system of the Spanish mainland system will have sufficient capacity to evacuate all the modelled generation and transport it to the points of consumption and that the variables of the electricity system remain within the ranges established by the legislation to achieve the level of safety required by the legislation. This will require the development and adaptation of such a network in such a way as to minimise renewable discharges or possible additional thermal generation needs due to possible internal grid constraints, so that only a reasonable minimum of possible distortions are introduced in respect of this single node assumption.

Simulations use as a baseline scenario a market of perfect competition in electricity generation and therefore do not include the potential strategies of generators to maximise their profits: the supply of each generator is equal to its estimated variable cost 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 time horizon analysed.

Variable generation cost values are based on the forecast fuel prices, estimated operating and maintenance costs of each technology and CO<sub>2</sub> emission costs. They are not considered as fixed generation costs, dismantling costs for groups currently in service and not considered in the scenario to be evaluated, any costs of extending the lifetime of generating groups or other factors (tolls, taxes) that may influence the supply strategy of the generation.

Cogeneration, renewable generation and, in general, all non-manageable generation is considered at zero variable cost, which gives them priority dispatch over other conventional thermal generation technologies.

For the purposes of calculating generation dispatch, each conventional thermal generation unit is modelled with its operating parameters, availability and unforeseeable failure rates. Hydropower generation is modelled consistently with historical production series and wind, photovoltaic and thermosolar generation using historical climate series of primary resource. Similarly, cogeneration and other generations are modelled according to 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, loading and lowering times, must run, reservoir levels, minimum/maximum hydraulic power, etc.) while minimising the total variable cost. In the simulations, the results of which are presented below, a restriction on the thermal generation coupled in the Spanish mainland system of a minimum value sufficient to ensure the dynamic stability of the electricity system has been implemented. This minimum generation required corresponds to the generation of 3 nuclear groups and 7 combined cycle groups to the minimum technical for the 2030 scenario.

For this analysis, minimum frequency/power control reserves have been included in all European countries. The frequency control reserve used in Spain is 2 400 MW.

As a result, in hourly detail, the values of energy generated by each thermal unit and modelled generation technology, marginal cost values, interchange balance and other variables, such as energy not supplied if any, resulting from the process of minimising the total variable cost of the system respecting the values of exchange capacity and the rest of the constraints imposed on the model are obtained. It is very important to stress 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 commercial capacity value considered in the scenario.

Using these results, the generation balance and interest indicators are calculated, such as the total value of renewable generation and the fraction 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 set out in the model includes the NECPs in force in May 2023 for the various Member States, as this is the latest information available upto date<sup>192</sup>. This scenario is adapted in accordance with the MITECO scenarios considered in the preparation of this NECP 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 scenarios, renewable generation profiles, installed generation capacity of each technology and its dispatch characteristics to determine the values corresponding to the Spanish mainland system, as well as the conversion of power values to net values. The scenarios obtained form the scenario, which is henceforth referred to as the adapted mainland scenario.

In addition, in the European scenario, the fuel cost assumptions assumed by MITECO are also changed. These new variable costs apply both to Spain and to the entire generation park considered in the European model.

The set of assumptions described above forms the basis for calculating the variable unit cost of electricity generation for each generation technology for determining the resulting generation balance, and the

---

The<sup>192</sup> data at European level used for this analysis are those contained in the 2022 edition of the ERAA, specifically the 'National Estimates' scenario, which corresponds to a scenario in which all countries translate their NECPs.

energy not supplied if any, in order to minimise the cost of the system while respecting the constraints imposed on the model.

Finally, it should be noted that the generation scenario installed in the rest of the systems maintains 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 assumptions in the NECP. The process of updating the energy and climate plans by the Member States of the European Union, as in Spain, is in the process of being drawn up and, therefore, the result of the simulations of dispatch of electricity generation at European level could produce different results depending on the degree of update of those plans.

### Assumptions of the scenarios defined by MITECO and corresponding adapted scenario values.

This section presents the scenarios of the scenarios defined by MITECO and, where applicable, the corresponding values of the adapted scenario peninsular<sup>193</sup>. Variable generation cost assumptions are used for the entire generation installed in the European model.

#### Variable generation costs

To determine the variable cost values of thermal generation technologies, the following fuel cost and CO<sub>2</sub> emission cost values set out in the MITECO scenario are used. For the rest of the fuels, the values of the scenario used as a basis for the European model under consideration are maintained. Variable operating and maintenance costs and efficiencies are also kept the same as in the European model.

Table D.1 shows fuel and CO emission prices<sup>2</sup> to EUR 2016.

**Table D.1. Fuel and CO<sub>2</sub> prices considered for 2030**

		Scenario	
		2030 MITECO	2030 adapted mainland
	<b>Nuclear</b>	0,47	0,47
	<b>Lignite</b>	3,01	3,01
	<b>Hard Coal</b>	3,01	3,01
<b>EUR/net GJ</b>	<b>Gas</b>	10,92	10,92
	<b>Light oil</b>	14,64	14,64
	<b>Heavy oil</b>	14,64	14,64
	<b>Oil shale</b>	3,01	3,01
<b>EUR/ton</b>	<b>Co<sub>2</sub> price</b>	<b>76,04</b>	<b>76,04</b>

Source: MITECO

Table D.2 shows the emission factors for each technology used in the European model in accordance with the criterion set out in the 2022 ERAA.

For the generation dispatch simulations carried out in this study, the emissions factor considered for cogeneration, electrical part, is 0.264 t/MWh.

<sup>193</sup>Values obtained by subtracting from the national power envisaged by the Ministry the predicted power of the TNPs.

Table D.2. Emissions factors by technologies considered in the European model.

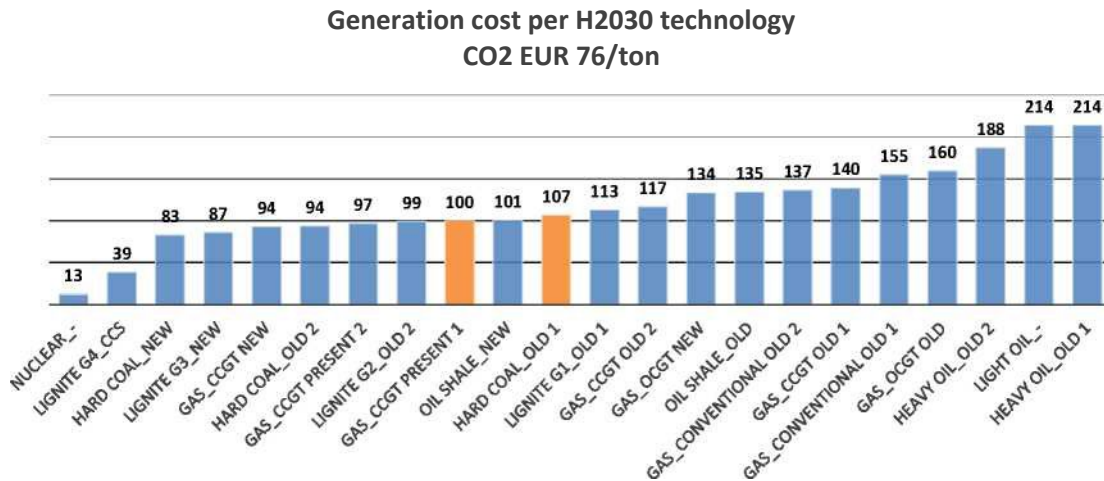
Fuel	T <sub>1</sub> - Trees	Co <sub>2</sub> emission	Average	Co <sub>2</sub> emission
		factor	efficiencies	factor
		kg/Net GJ	%	t/MWh <sub>e</sub>
<b>Nuclear</b>	—	0	33 %	0,000
<b>Hard coal</b>	Old 1	94	35 %	0,97
<b>Hard coal</b>	Old 2	94	40 %	0,85
<b>Hard coal</b>	New	94	46 %	0,74
<b>Hard coal</b>	CCS	9.4	38 %	0,09
<b>Lignite</b>	Old 1	101	35 %	1,04
<b>Lignite</b>	Old 2	101	40 %	0,91
<b>Lignite</b>	New	101	46 %	0,79
<b>Lignite</b>	CCS	10,1	38 %	0,10
<b>Gas</b>	conventional old 1	57	36 %	0,57
<b>Gas</b>	conventional old 2	57	41 %	0,50
<b>Gas</b>	CCGT old 1	57	40 %	0,51
<b>Gas</b>	CCGT old 2	57	48 %	0,43
<b>Gas</b>	CCGT present 1	57	56 %	0,37
<b>Gas</b>	CCGT present 2	57	58 %	0,35
<b>Gas</b>	CCGT new	57	60 %	0,34
<b>Gas</b>	CCGT CCS	5,7	51 %	0,04
<b>Gas</b>	OCGT old	57	35 %	0,59
<b>Gas</b>	OCGT new	57	42 %	0,49
<b>Light oil</b>	—	78	35 %	0,80
<b>Heavy oil</b>	Old 1	78	35 %	0,80
<b>Heavy oil</b>	Old 2	78	40 %	0,70

Source: Red Eléctrica de España

As a result of the above assumptions on fuel prices and CO<sub>2</sub> emissions, the variable generation costs of the generation technologies considered in the Europe-wide scenario are obtained, as shown in Figure D.2, at EUR 2016. In this figure, the technologies installed in the Spanish mainland system are those depicted in orange.



Figure D.2. Generation cost per technology of the H2030 scenario.



### Hours of operation of renewable generation

Table D.3 shows the operating hours that are introduced into the model obtained from the information provided by MITECO for the Spanish system. In the case of discharges, the number of operating hours resulting from the simulation may be reduced.

Table D.3. Annual operating hours per technology

Technologies	R	I Annual operations MITECO 2030
Onshore wind <sup>(1)</sup>		2.100-2.500
Wind offshore		4.278
Thermo-solar		2.200-3.594
Photovoltaic <sup>(1)</sup>		1.800-2.000
Cogeneration and others <sup>(2)</sup>		4.770
Other RES <sup>(2)</sup>		7.000

(1) Depending on whether it is existing/reboosted/new/self-consumption/electrolyser associated

(2) Weighted average of the different types of technology of which it is composed

Source: Red Eléctrica de España

### Demand

In order to establish the expected demand values, the values at national level provided by MITECO have been adapted to values for the Spanish mainland system. In the rest of the systems, the values of the analysis of the European model under consideration are used.

The values considered in the model – adapted scenario – for the path of the PNIEC 2023-2030 scenario are shown in Table D.4.

Table D.4. Demand values PNIEC 2023-2030 MITECO

Demand	2023-2030 NECP scenario Peninsula ADAPTED
	2030
<b>Demand (TWh)</b>	<b>316,5</b>
<b>Peak of demand (MW)</b>	51.447

Source: Red Eléctrica de España

### Installed generation park

The generation park considered by MITECO in the PNIEC 2023-2030 scenario is set out in Table D.5.

Table D.5. Installed Power Scenario PNIEC 2023-2030 MITECO

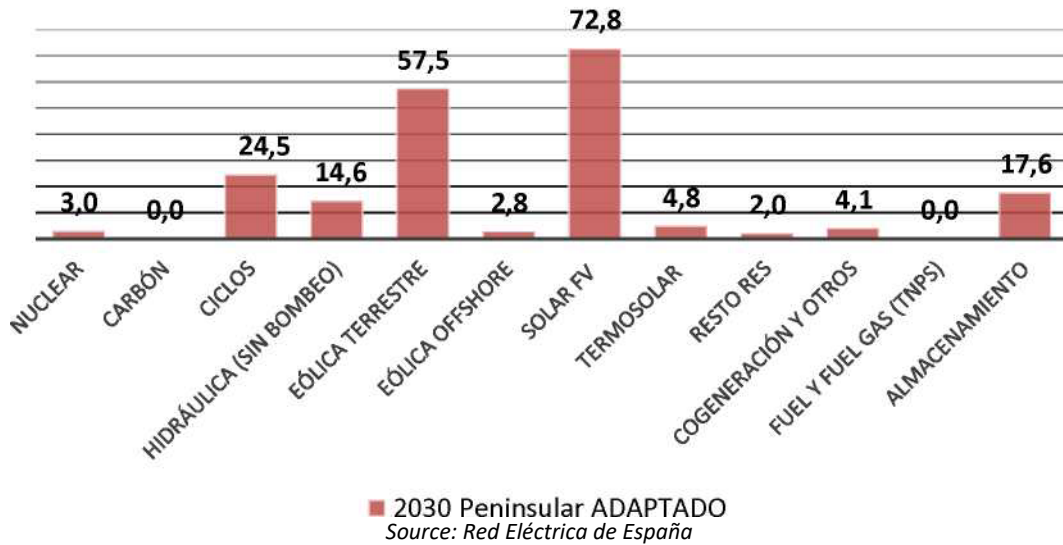
Technologies (data in MW)	MITECO (national)	Peninsula ADAPTED
	2030	2030
<b>Nuclear</b>	3.181	3.041
<b>Coal</b>	0	0
<b>Cycles</b>	26.612	24.498
<b>Hydraulic (not pumped)</b>	14.511	14.561
<b>Wind onshore</b>	59.044	57.512
<b>Offshore wind</b>	3.000	2.800
<b>Solar FV</b>	76.387	72.751
<b>Thermo-solar</b>	4.800	4.800
<b>Other RES</b>	1.964	1.964
<b>Cogeneration and others</b>	4.091	4.071
<b>Fuel and Fuel Gas (TNPs)</b>	1.830	
<b>Storage</b>	18.543	17.637
<b>Total</b>	<b>213.963</b>	<b>203.635</b>

Source: MITECO/Red Eléctrica

It is worth noting the gradual reduction of the nuclear power plant until three nuclear groups out of the seven currently available are considered available in 2030, and the closure of the coal-fired power plant until its disappearance. It is considered that there is a strong growth of the renewable generation fleet, mainly in wind and solar photovoltaic generation compared to the park currently in operation and the installation of new thermosolar generation over the period under consideration, and a significant growth in self-consumption. Cogeneration is slightly reduced compared to the current value.

Figure D.3 shows the net power values corresponding to each generation technology in the Spanish electricity system in mainland Spain.

Figure D.3. Installed capacity in the Spanish Peninsular System Adapted H2030 scenario MITECO  
Potencia instalada, GW



In addition to the table and graph, 10.880 MW of electrolyzers were modelled in 2030.

### Commercial capacity for exchange with neighbouring electricity systems

Table D.6 shows the values of exchange capacity with France and Portugal.

Table D.6. Interconnection values Spain-France, Spain-Portugal

NTC (MW)	NECP 2023-2030
	MITECO
	2030
- > FR	8.000
FR -> IS	8.000
- > PT	4.200
PT -> IS	3.500

Source: Red Eléctrica de España

Exchanges between Spain and Morocco and exchanges between the mainland and the Balearic Islands and Ceuta are modelled with fixed time exchange profiles, as these are areas that are not explicitly modelled. In line with the 2021-2026 transport network planning for the Balearic Islands, a second link to mainland Spain has been considered in scenario 2030, while for Ceuta it is assumed that its link to the peninsula would also be available in 2030.

### Results of the scenario analysed for the horizon 2030

The full results of the simulation of the PNIEC scenario 2023-2030 horizon 2030 are presented in Table D.7 and Figure D.4.

Table D.7. Results PNIEC 2023-2030 H2030 scenario

Scenario	Objective H2030			
<b>Demand [TWh] (*)</b>	<b>316,5</b>			
<b>Generation [TWh]</b>	<b>376,55</b>			
<b>Technology;</b>	<b>Generation [GWh]</b>	<b>% over generation total</b>	<b>Pot. Installed [MW]</b>	<b>Hours equiv.p.c.</b>
Nuclear	34.573	9.18 %	3.041	6.778
Coal	0	0.00 %	0	0
Combined cycle	16.516	4.39 %	24.499	674
Hydraulic (not pumped)	28.941	7.69 %	14.562	1.987
Wind onshore	116.970	31.06 %	57.522	2.033
Wind offshore	9.769	2.59 %	2.800	3.489
Solar FV	127.212	33.78 %	72.751	1.749
Thermo-solar	9.470	2.51 %	4.804	1.971
Other RES	13.743	3.65 %	1.964	6.997
Cogen and Others	19.356	5.14 %	4.071	4.755
<b>Balance sheet [GWh]</b>	<b>– 7.404</b>			
Consumption (GWh)	36.620			
Production (GWh)	29.215			
<b>RENOVABLE generation [GWh]</b>	<b>306.105</b>			
Renewables discharges [GWh]	25,166			
<b>INTERCONNECTIONS</b>				
<b>Net balance [GWh]</b>	<b>–</b>			
<b>(+ export from SPAIN)</b>	<b>51.372</b>			
France [GWh]	49.105			
Portugal [GWh]	2.267			
<b>Congestion (% hours) ES-FR</b>				
ES – > FR	67 %			
FR – > EN	3 %			
<b>Congestion (% hours) ES-PT</b>				
ES – > PT	5 %			
PT – > IS	12 %			
<b>Spread MEDIO ES – FR [EUR/MWh]</b>	<b>22,2</b>			
<b>SYSTEM COSTS</b>				
Marginal cost [EUR/MWh]	33,4			
Variable generation cost [EUR/MWh]	34,6			
Total annual vable cost gene	9.342			
<b>CONGESTION INCOME SPAIN [MEUR]</b>	<b>815</b>			
<b>RES participation indicators (%)</b>				
RES/Gen without storage	81 %			
RES/Claim	97 %			

Notes: (\*) Includes self-consumed demand.

**Marginal average cost (EUR/MWh):** Demand-weighted energy purchase cost.

**Variable generation cost (EUR/MWh):** Cost of purchasing energy plus the cost of additional thermal generation required to reach the minimum threshold for dispatchable synchronous generation.

**Annual total variable cost generation (MEUR):** Total cost of purchasing the energy plus the total cost of the additional thermal generation required to reach the minimum threshold for dispatchable synchronous generation.

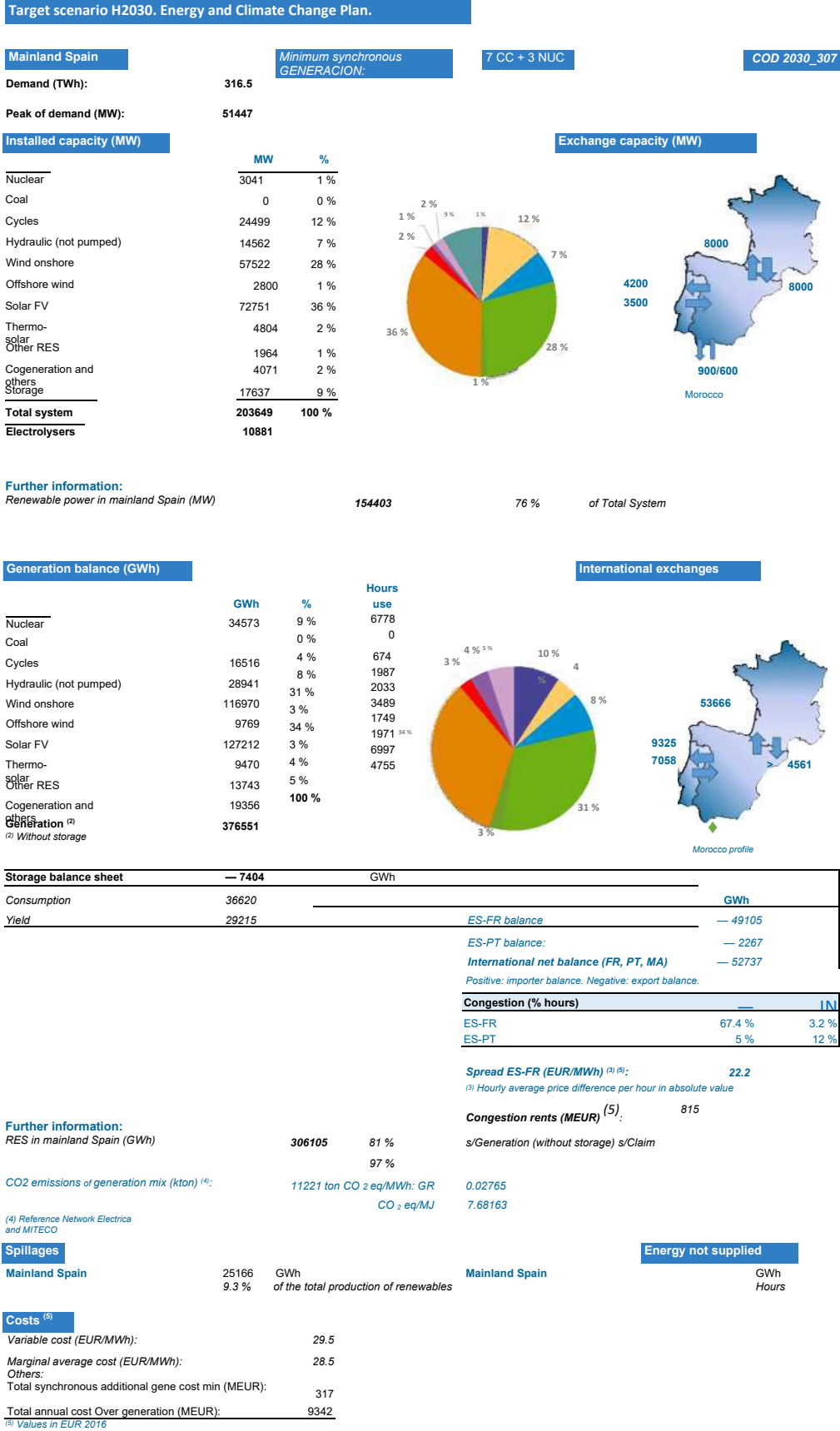
Source: Red Eléctrica de España

In 2030, on the basis of the assumptions considered, all renewables reached a penetration of 81 % of

non-storage generation and a net balance with France and Portugal of around 51 TWh, with a NTC between Spain and France of 8 GW.

The discharges obtained are 25 TWh, 9.3 % of the total production of renewables.

Figure D.4. Results Scenario PNIEC 2023-2030 H2030



Source: Red Eléctrica de España

## ANNEX D.2. PROBABILISTIC SUMINISTRO ASSURANCE STUDIES OF THE 2023-2030 NECP SCENARIO, HORIZON 2030

The methodology used and the results of the studies on coverage of the Spanish mainland system for the PNIEC 2023-2030 horizon 2030 defined by MITECO to verify the security of supply in the scenario in terms of demand coverage are set out below.

It also briefly describes the probabilistic methodology used, in line with that developed at European level in<sup>194</sup> ENTSO-E for ERAA (*E Resource Adequacy Assessment*)<sup>195</sup> and a description of the meaning of demand coverage indices.

### Probabilistic resource adequacy analysis methodology

Demand coverage refers to the capacity of the generation resources available to supply electricity demand in the system at all times of the study year and consists of the existence of sufficient resources to meet both consumer demand and the operational requirements of the electricity system. This capacity to supply demand is quantified by determining the values corresponding to the study scenario of the various coverage indicators, which will be detailed below.

The adequacy analysis in the PNIEC 2023-2030 horizon 2030 scenario consists of verifying compliance with the criteria for covering system demand, using the probabilistic methodology defined by the European legislation<sup>196</sup> and applied by ENTSO- E in the medium term adequacy assessments (ERAA).

The same model is used for the resource adequacy analysis as for drawing up the generation balances, although the model is specified to represent a set of climate years, in accordance with the probabilistic methodology.

The results of the probabilistic studies depend on a number of variables that can be considered independent of each other, mainly the unavailability of the interconnections between neighbouring systems and the fortuitous unavailability of generating groups, and other variables dependent on climate change, and which therefore cannot be considered, or modelled as independent from each other, mainly in terms of demand values and hydraulic, photovoltaic and wind production capacities.

Stochastic uncertainty dependent on climate variables is modelled by a series of 35 climate years used in ENTSO-E (1982-2016) in the scope of ERAA.

Each climate year selected consists of the combination of the meteorological variables recorded in that year relating to temperatures, wind, solar irradiation and availability of hydraulic resources extrapolated to the estimate of demand and renewable generation, taking into account the energy demanded in an average year estimated for each climate year and the hydropower, wind and solar generation capacities estimated in the PNIEC 2023-2030 scenario for that year. These data provide time series for a full year of system demand and renewable generation with a profile corresponding to that climate year. The average demand over the 35 years is the demand for mainland electricity estimated decisively in the PNIEC 2023-2030

---

European<sup>194</sup> Network of Transmission System Operators for Electricity.

<sup>195</sup> <https://www.entsoe.eu/outlooks/eraa/>

<sup>196</sup> Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity.

ACER Decision of 2 October on the European resource adequacy assessment methodology.

scenario for 2030.

Stochastic uncertainty depending on the unavailability of fortuitous generation groups is modelled by simulations of Monte Carlo, which randomly allocate the hourly patterns of accidental unavailability of generators and interconnection lines, affecting the availability of generation groups in each hour. For each climate year of the series, 10 sorts ( $N = 10$ ) are simulated, giving a total of 350 different simulations for each hour of the year, i.e. the simulation of 350 years of possible Monte Carlo corresponding to year 2030 in the PNIEC Scenario 2023-2030.

For this probabilistic analysis, minimum frequency/power control reservations have been included in all European countries. The frequency control reserve used in Spain is 2 400 MW.

The tool used 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 optimisation algorithm is used in the demand adequacy analysis for the determination of flows through interconnections between the different systems through simulations that determine the generation dispatch calculation. These simulations use as a base scenario a market for perfect competition in electricity generation. The variable generation cost values are those used for the generation dispatch studies in the PNIEC 2023-2030 horizon 2030 scenario.

Detailed information on the different scenarios used for the adequacy analysis of the PNIEC 2023-2030 horizon 2030 scenario is included in the final part of this Annex.

### **Demand coverage indicators**

Demand coverage consists of sufficient resources to meet both consumer demand and the operational requirements of the electricity system. The so-called coverage indices or indicators are used as a measure:



**Expected value of energy not delivered (EENS) [MWh/year or GWh/year]**

EENS is the annual average of the energy not supplied 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-supplied energy referred to in paragraph 5 (j) of Regulation (EU) 2019/943 of 5 June 2019 on the internal market in electricity.

In adequacy studies with the described methodology, the expected value of undelivered energy (EENS) is assessed as an estimate from a certain number of simulations of possible scenarios. To this end, the EENS is a measure of security of supply forecasting and is mathematically described as follows:

$$EENS = \frac{1}{N} \sum_{j=1}^N ENS_j$$

where  $ENS_j$  is the energy not delivered in system  $j$  ( $j - S$ ), associated with a load loss event from simulation  $j$  to Monte Carlo, and where  $N$  is the number of Monte Carlo simulations considered.

**Expected Loss Load (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-charge forecast indicator referred to in paragraph 5 (j) of Regulation (EU) 2019/943 of 5 June 2019 on the internal market in electricity.

$$LOLE = \frac{1}{N} \sum_{j=1}^N LLD_j$$

where  $LLD_j$  is the duration of the loss of load of system  $j$  ( $j - S$ ), associated with a load loss event from simulation  $j$  to Monte Carlo, and where  $N$  is the number of Monte Carlo simulations considered.

Note that the LLD of Monte Carlo simulation  $j$  can only be reported as a whole number of hours due to the hourly resolution of the simulation. Therefore, it does not reflect the severity of the deficiency or the duration of the loss of load within that hour.

**Loss of Load Probability (LOLP) [%]**

LOLP measures the probability of not meeting all demand with available generation and imports within a defined period of time.

$$LOLP = \frac{LOLE}{h}$$

where  $h$  corresponds to the number of hours in the time period under study, usually one year.

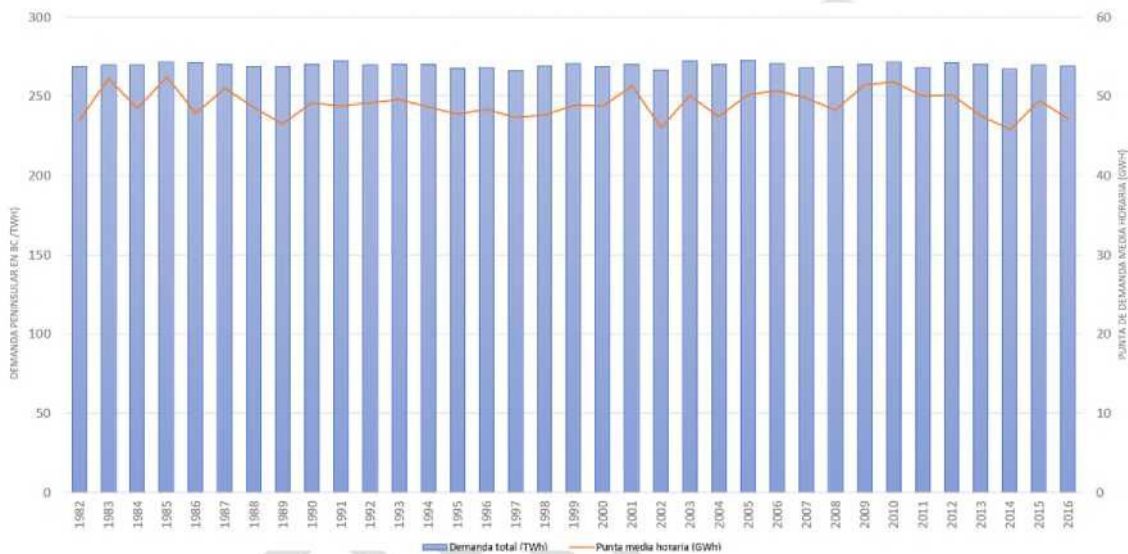
## Detailed assumptions of the adequacy analysis for the 2023 PNIEC2030 horizon 2030 scenario

The study scenarios have generally been included in section D.1, so this section indicates the additional assumptions of the coverage study.

### Climatic years considered

35 climate years between 1982 and 2016 have been considered. The demand and peak profiles used are shown in Figure D.5.

**Figure D.5. Annual demand values and peak average hourly demand in each of the modelled climate years**

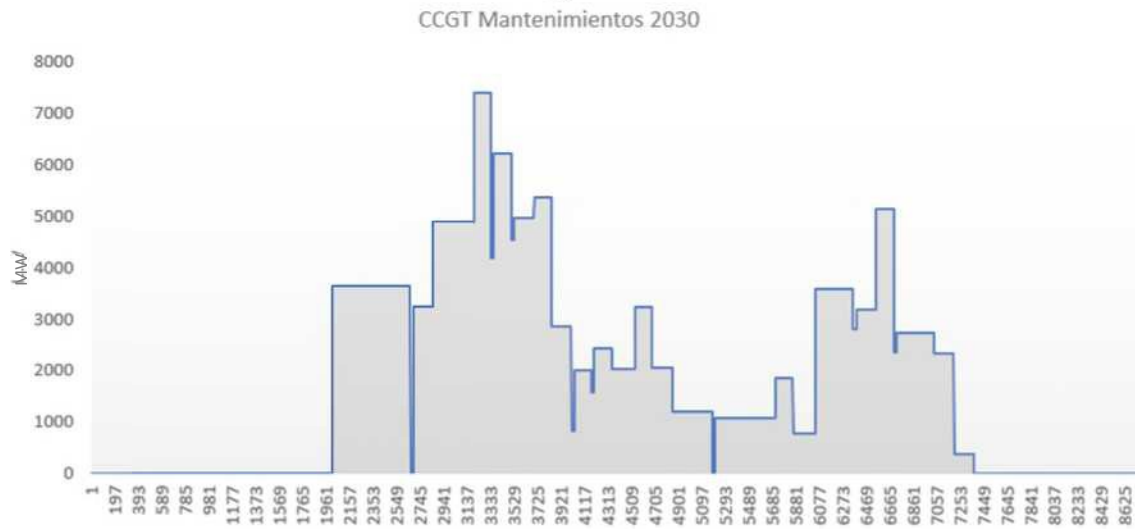


Source: Red Eléctrica de España

### Considered generation outages

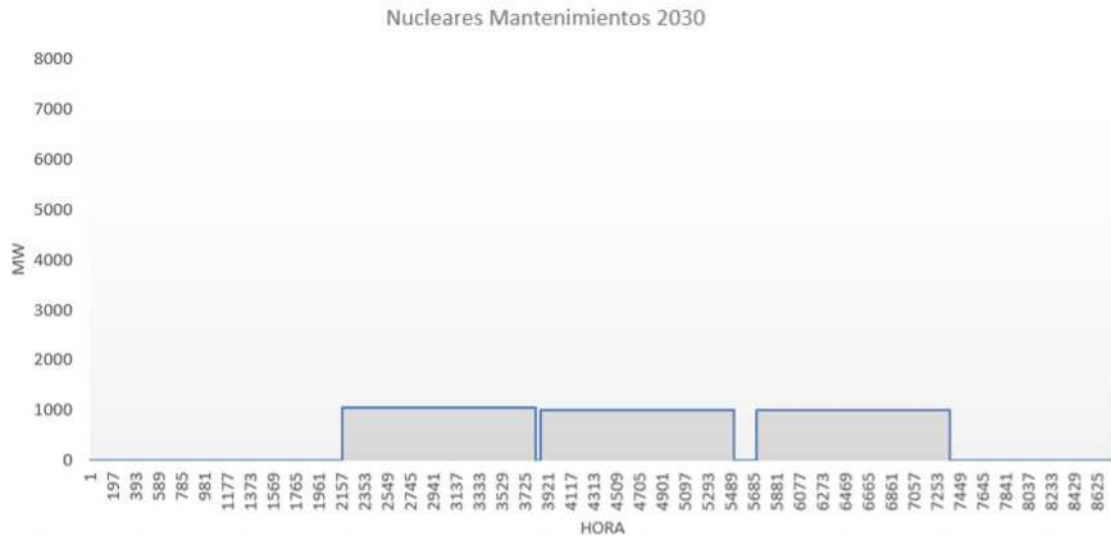
An unavailability value is considered to be 5 % of the time in each of the modelled thermal groups. In the case of Spain, that value is maintained for cycles, the value for nuclear plants being 3 %, in addition to this value, they are considered to be scheduled maintenance in the various nuclear and combined cycle thermal units. Figures D.8 and D.9 show the number of hours during which a certain number of simultaneously unavailable nuclear or combined cycle units have been modelled due to scheduled outages.

Figure D.6. Programmed outages of combined cycles



Source: Red Eléctrica de España

Figure D.7. Planned outages of nuclear



### Outages of interconnections considered

In general, the model considers a planned and incidental unavailability of interconnections according to the information provided by each TSO. In the case of Spain, the NTC values already take into account those failure and maintenance rates.

### **Outcome of the 2023-2030 PNIEC scenario for 2030 and conclusions**

The results of the values corresponding to the coverage indicators of the analysis of the PNIEC 2023-2030 horizon 2030 are shown in Table D.8. This table shows the total demands in plant bars considered in each climate year, the peak demand value, and the values of the coverage indices EENS (Esperanza de Energía Non-Supply), LOLE (annual expected hours with loss of load) and LOLP (annual probability of loss of load).

The results obtained from the analysis of the coverage of the Spanish mainland system for this PNIEC 2023-2030 scenario for 2030 indicate that the coverage of demand is ensured, with no risk observed in the climate years analysed.

These values are much lower than the coverage indicator values used in some European countries for the design of generation needs to cover demand at around 3 h/year with undelivered energy. In Spain, a loss of load indicator is used in island systems with a maximum value of 0,2 hours/month, set out in Royal Decree 738/2015.

It can therefore be 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 the coverage of demand for single node.

**Table D.8. Results of probabilistic analysis of coverage.  
2023-2030 NECP scenario for 2030. Base case. Spain.**

	Demand		Coverage indicators		
	Total demand (TWh)	Tip (GW)	ENS (MWh/year)	LOLE (h/year)	LOLP (%)
1982	269	47	0	0	0 %
1983	270	52	0	0	0 %
1984	270	48	0	0	0 %
1985	271	52	0	0	0 %
1986	271	48	0	0	0 %
1987	270	51	0	0	0 %
1988	268	48	0	0	0 %
1989	269	46	0	0	0 %
1990	270	49	0	0	0 %
1991	272	49	0	0	0 %
1992	269	49	0	0	0 %
1993	270	50	0	0	0 %
1994	270	49	0	0	0 %
1995	267	48	0	0	0 %
1996	268	48	0	0	0 %
1997	266	47	0	0	0 %
1998	269	48	0	0	0 %
1999	271	49	0	0	0 %
2000	269	49	0	0	0 %
2001	270	51	0	0	0 %
2002	266	46	0	0	0 %
2003	272	50	0	0	0 %
2004	270	47	0	0	0 %
2005	273	50	0	0	0 %
2006	270	51	0	0	0 %
2007	268	50	0	0	0 %
2008	269	48	0	0	0 %
2009	270	51	0	0	0 %
2010	272	52	0	0	0 %
2011	268	50	0	0	0 %
2012	271	50	0	0	0 %
2013	270	48	0	0	0 %
2014	267	46	0	0	0 %
2015	270	49	0	0	0 %
2016	269	47	0	0	0 %
<b>Average value</b>			<b>0</b>	<b>0</b>	<b>0 %</b>

Source: Red Eléctrica de España

## ANNEX E. CONTRIBUTION OF THE PLAN TO THE SUSTAINABLE DEVELOPMENT GOALS OF THE 2030 AGENDA

On 25 September 2015, the United Nations Assembly adopted the 2030 Agenda for Sustainable

Development, an opportunity for countries and their societies to embark on a new path to improve the lives of all, leaving no one behind.

The Agenda has [17 Sustainable Development Goals](#), ranging from the elimination of poverty to tackling climate change, education, gender equality, environmental protection and the design of our cities.



The Kingdom of Spain undertook, within the United Nations, to make the 2030 Agenda a reality. In this spirit, on 29 June 2018, on the proposal of the High Level Working Party on the 2030 Agenda, the Council of Ministers endorsed the **“ActionPlan for the Implementation of the 2030 Agenda: Towards a Spanish Strategy for Sustainable Development”**. This plan highlights Spain’s commitment to Agenda 2030 and the need for it to be a reference for all public policies.

**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.**

In compliance with the mandate of the Regulation on the Governance of the Energy Union and Climate Action, the **2021-2030 NECP** was drawn up 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 climate action objectives set by the EU without neglecting the response to the commitment to the 2030 Agenda. In this regard, it is an instrument intended to contribute mainly 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”**, 8 **“Decent work and economic growth”**, 9 **“Industry and Innovation”**, 11 **“Sustainable cities and communities”** or 15 **“Life on land”**.

With a view to conveying renewed impetus to public policies, once almost half of the deadline for achieving the objectives of the agenda had been met, the Council of Ministers approved the **2030 Sustainable Development Strategy** on 5 June 2021, which presents a number of country challenges, including **Challenge No 2: Addressing the climate and environmental emergency fully** refers to the scope and competence of the NECP on important issues such 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 included in the revision of the NECP to the SDGs.

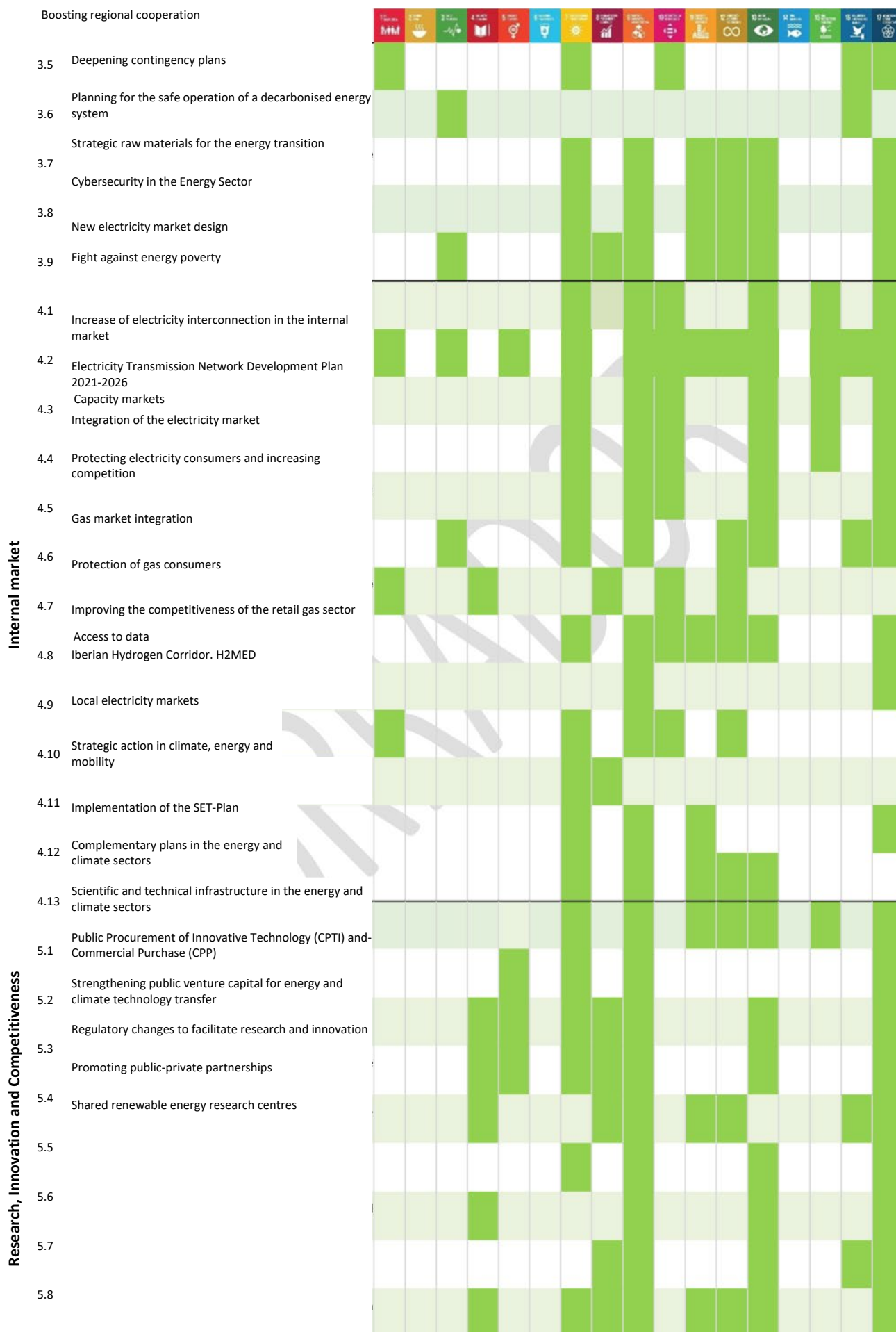
**Table E.1. Interactions between the NECP and the SDGs**

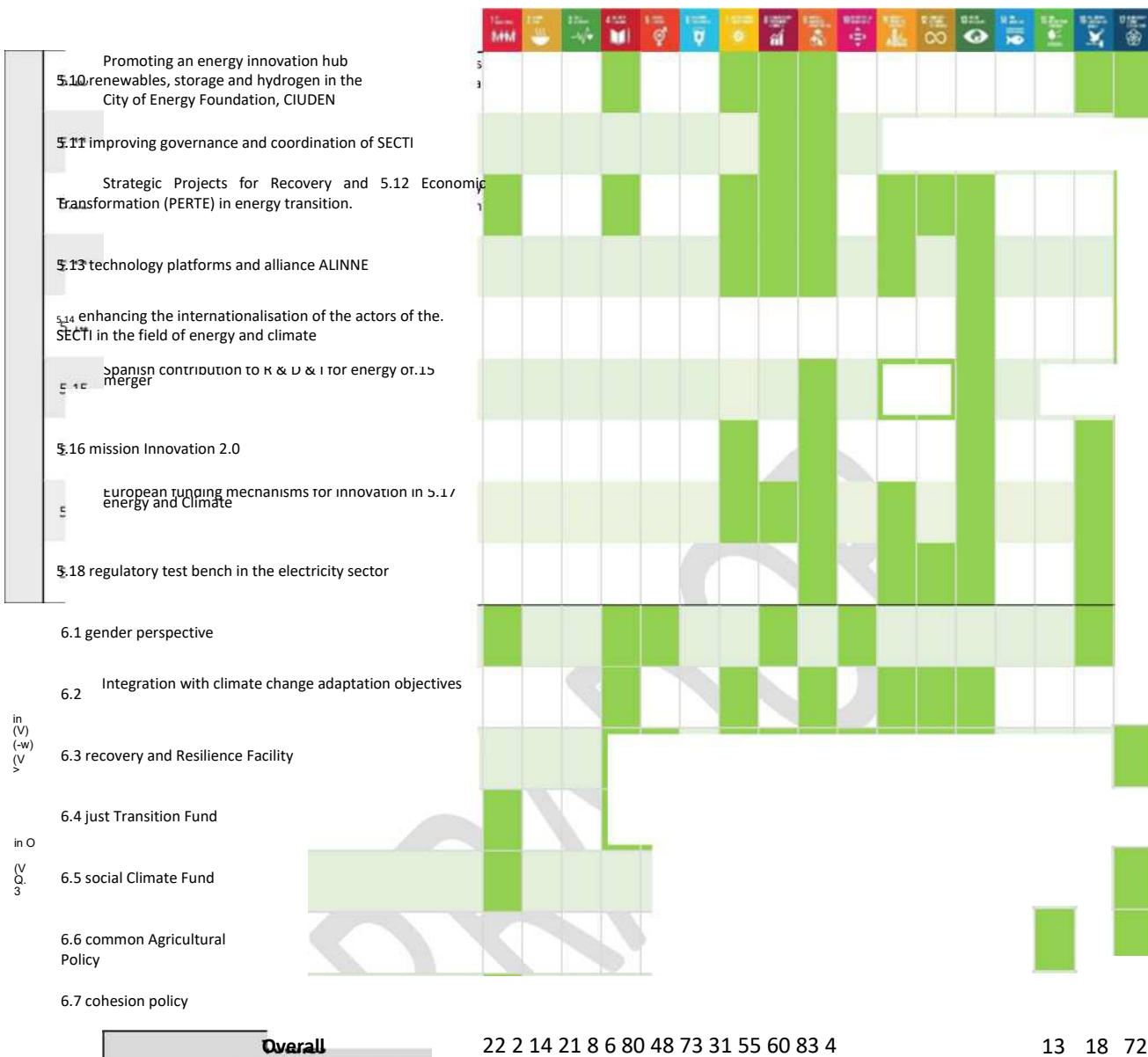
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.1 Development of renewable energy compatible with biodiversity and ecosystem protection																	
1.2 Development of renewable energy compatible with the territory and rural development.																	
1.3 Development of new electricity-generating installations using renewable energy																	
1.4 Development of innovative renewable energy installations																	
1.5 Energy storage																	
1.6 Demand management and flexibility																	
1.7 Adaptation of electricity grids for the integration of renewables																	
1.8 Development of self-consumption with renewables and distributed generation																	
1.9 Development of new hydroelectric energy storage capacity																	
1.10 Decarbonisation of the Industrial Sector																	
1.11 Framework for the development of thermal renewables																	
1.12 Advanced renewable biofuels in transport																	
1.13 Decarbonisation of the maritime transport																	
1.14 Decarbonisation of air transport																	
1.15 Development of biogas and biomethane																	
1.16 Development of renewable hydrogen																	
1.17 Plan for the repowering and reengineering of existing renewable electricity generation projects																	
1.18 Strategic autonomy and value chain																	
1.19 New business models for the energy transition																	
1.20 Promotion of bilateral procurement and promotion of forward markets for renewable electricity																	
1.21 Specific programmes for biomass harvesting																	
1.22 Unique projects and strategy for sustainable energy on islands																	
1.23 Energy Communities																	
1.24 Citizenship at the Centre																	
1.25 Fair transition strategy																	
1.26 Public procurement of renewable energy																	











## ANNEX F. MEASURES AND METHODOLOGY TO IMPLEMENT ARTICLE 7 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 Directive as at<sup>97</sup> (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 make it possible to achieve the energy savings obligation for the period 2021-2030, in accordance with Article 7 of the EED.

It should be noted that the EED is currently in the process of being revised, so we take into account the provisions contained in the draft text resulting from the political trilogue phase on 9 March 2023.

### F.2. BACKGROUND

**The energy savings obligation** set out in Article 7 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 0.8 % of annual final energy consumption, averaged over the most recent three-year period prior to 1 January 2019.

In compliance with this obligation, Spain notified the European Commission of a cumulative savings target of 36.809 ktoe for the period 2021-2030, although this value should be updated to 37.206 ktoe taking into account the latest values published by Eurostat for annual final energy consumption in Spain for the years 2016, 2017 and 2018, the average of which is 84.560 ktoe. Thus, the annual savings target for each of the years of the period is 676 ktoe, assuming a linear distribution of the target over the period.

However, this objective has fallen behind the agreement reached between Parliament, the Council and the Commission on the new text of the Energy Efficiency Directive. Thus, this Plan established a new cumulative target value for final energy savings for the period 2021-2030 of 1.49 % on average, corresponding to a cumulative 53.593 ktoe, based on a stepwise increase in the intensity of the target, in accordance with the provisions of that directive.

In order to achieve the final energy savings target for the period 2021-2030, 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 line with Article 7a EED. Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency regulates and creates the National Energy Efficiency Obligations System and, within the SNOEE, the National Efficiency Fund.

<sup>7</sup> Directive 2012/27/EU of 25 October 2012 on energy efficiency and Directive (EU) 2018/2002 of 11 December 2018 amending Directive 2012/27/EU on energy efficiency.

Energy and, alternatively, the Energy Saving Certificates System, CAE, regulated by Royal Decree 36/2023 of 24 January.

- Alternative policy measures, such as taxation, regulation, voluntary agreements, etc.; in line with Article 7b EED.

Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and in other areas for economic recovery amended Law 18/2014 of 15 October, extending the validity of the SNOEE until 31 December 2030, in accordance with the provisions of Directive (EU) 2018/2002 amending the Energy Efficiency Directive.

### F.3. CALCULATION OF THE LEVEL OF ENERGY SAVINGS OBLIGATION 2021-2030

This section provides a description of the calculation of energy savings to be achieved over the entire period from 1 January 2021 to 31 December 2030. The calculation has been made, in accordance with Article 7(b) (1), first subparagraph, of the Energy Efficiency Directive, on the basis of annual final energy consumption (in ktoe), averaged over the most recent three-year period prior to 1 January 2019 and using statistical data from Eurostat. The details of the annual final energy consumption for the years 2016, 2017 and 2018 are set out in the following table:

**Table F.1. Final energy consumption for the years 2016, 2017, 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

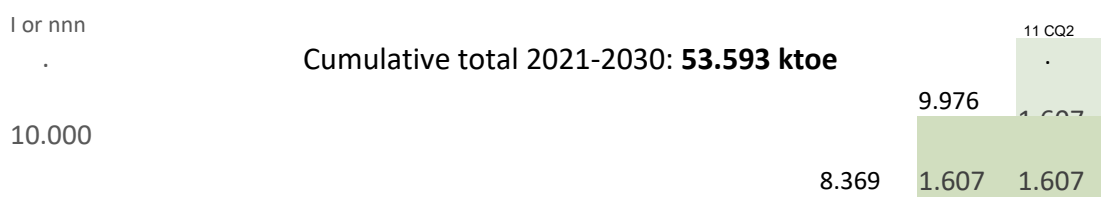
Based on these annual consumption, the initial new savings target for each year, assuming a linear distribution of savings, was **676 ktoe/year** (equivalent to 8 % of the average value of 84.560 ktoe) and thus the **total cumulative volume of final energy savings for the period 2021-2030 remained at 37.206 ktoe**.

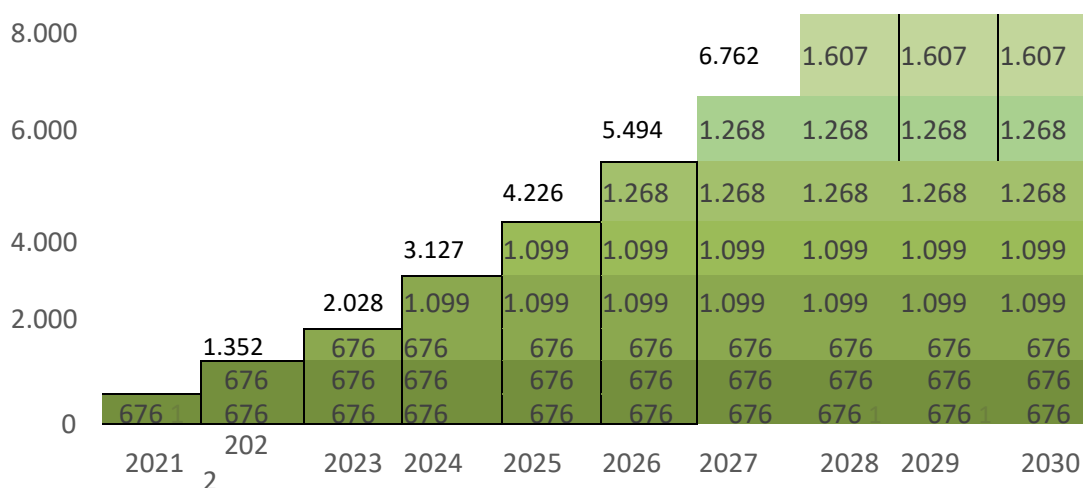
However, the agreement reached as part of the trilogue procedure for the revision of the text of the Energy Efficiency Directive has established a new cumulative target value for final energy savings of 1.49 % on average, based on a stepwise increase in the intensity of the target:

- 1.3 % for 2024-2025,
- 1.5 % for 2026-2027,
- 1.9 % for 2028-2030.

Finally, the cumulative total volume of final energy savings for the period 2021-2030 would amount to 53.593 ktoe. The following figure shows the distribution of savings over the period according to the proposed new targets:

**Figure F.1. Cumulative interim target for final energy savings: 2021-2030**





Source: Ministry for Ecological Transition and the Demographic Challenge 2023

Finally, it should be noted that, although this objective is not yet in force, this document sets out the savings path and the set of measures to be put in place to achieve it.

#### F.4. SECTORAL DISTRIBUTION OF THE ENERGY SAVINGS TARGET

Chapter 3.2.1 of the NECP on 'Measures for the fulfilment of the energy savings obligation. Sectoral approach' proposes a sectoral distribution of the cumulative final energy savings target for the whole period of 53.593 ktoe, among the five energy-consuming sectors: transport, industry, residential, tertiary and agriculture and fisheries.

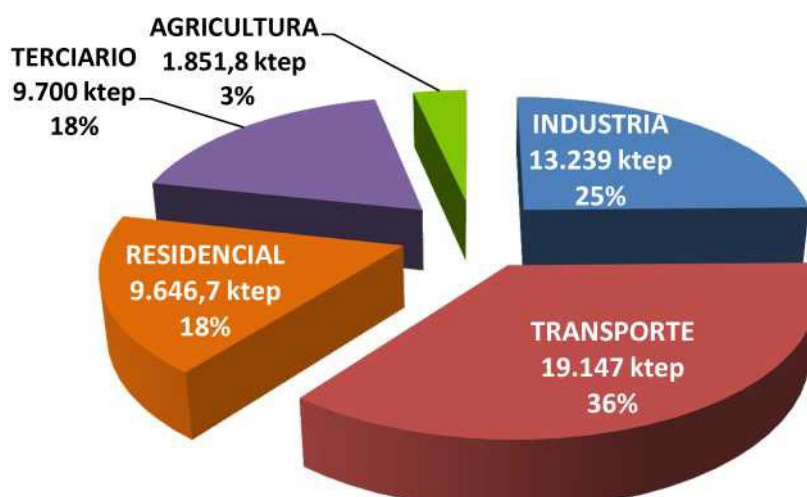
**15 large groups of sectoral energy efficiency measures and 8 more horizontal energy efficiency measures have been designed**, which in turn are divided, depending on the instrument used, into sub-measures so as to achieve such an ambitious cumulative final energy savings target (the cumulative final energy savings target for the period 2021-2030 is 3,4 times higher than the cumulative savings target of the previous period 2014-2020).

For the current obligation period, 2021-2030, the Ministry for the Ecological Transition and the Demographic Challenge has made a forecast in which the transport sector is expected to contribute most to the cumulative final energy savings target for the period 2021-2030, assigning it a savings target of 19 Mtoe, representing 36 % of the cumulative energy savings target in the period. It is followed by the industrial sector, with a cumulative savings target of 13 Mtoe for the period, which represents 25 % of the target. The residential sector has a saving target of 6,7 Mtoe, accounting for 18 % of the total as the tertiary sector. The agriculture and fisheries sector represents the lowest contribution with 1,9 Mtoe (3 %) of cumulative savings. The graphic representation of this breakdown is shown in the figure below.

**Table F.2. Energy efficiency measures for the period 2021-2030 (ktoe)**

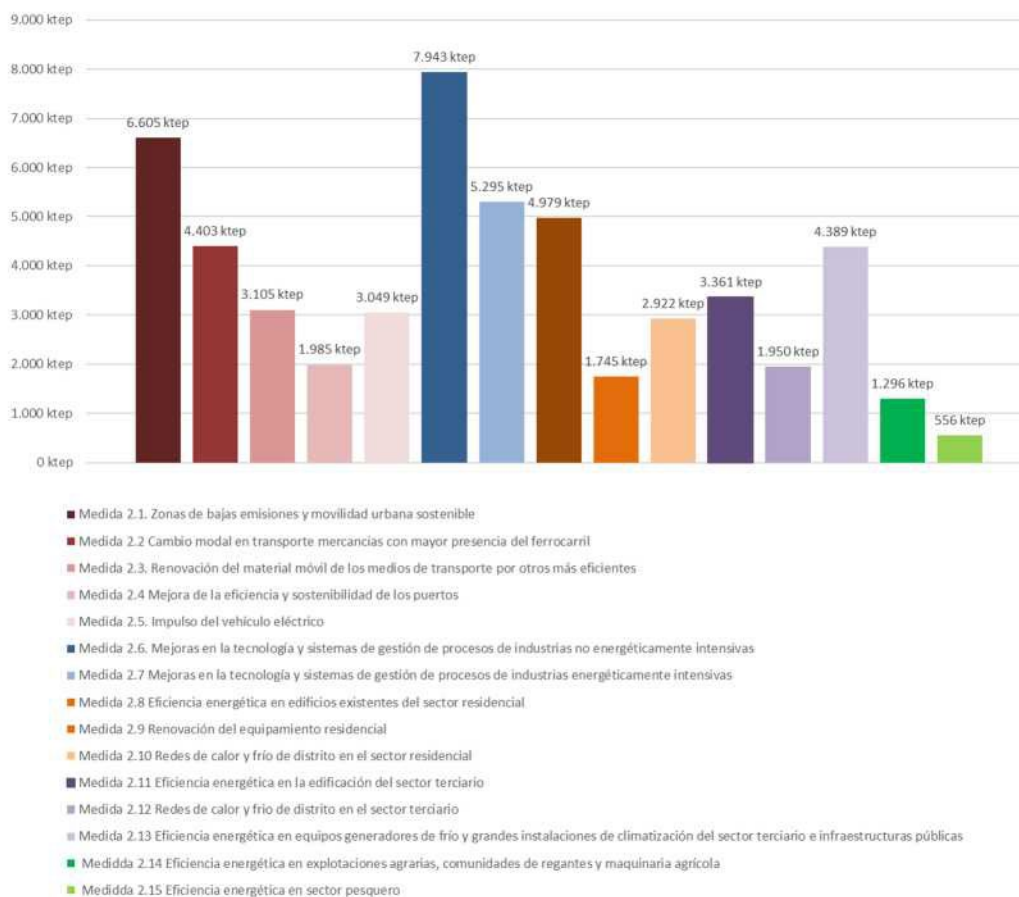
<b>TRANSPORT</b>		<b>19.146,9 ktoe</b>
2.1	Low emission zones and modal shift measures	6.604,7 ktoe
2.2	Modal shift in freight transport with a higher presence of rail	4.403,1 ktoe
2.3	Renovation of rolling stock of means of transport and energy efficiency in management	3.105,0 ktoe
2.4	Improving the efficiency and sustainability of ports	1.984,9 ktoe
2.5	Promotion of electric vehicles	3.049,2 ktoe
<b>INDUSTRY</b>		<b>13.238,9 ktoe</b>
2.6	Improvements in technology and process management systems in non-energy intensive industries	7.943,5 ktoe
2.7	Improvements in technology and process management systems in energy intensive industries	5.295,4 ktoe
<b>RESIDENTIAL</b>		<b>9.646,7 ktoe</b>
2.8	Energy efficiency in existing buildings in the residential sector	4.979,4 ktoe
2.9	Renewal of residential equipment	1.745,2 ktoe
2.10	District heating and cooling networks	2.922,1 ktoe
<b>TERTIARY</b>		<b>9.699,8 ktoe</b>
2.11	Energy efficiency in buildings in the tertiary sector.	3.361,5 ktoe
2.12	District heat and cooling networks in the tertiary sector	1.949,7 ktoe
2.13	Energy efficiency in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure	4.388,7 ktoe
<b>AGRICULTURE AND FISHERIES</b>		<b>1.851,8 ktoe</b>
2.14	Energy efficiency on farms, irrigation communities and agricultural machinery	1.293,3 ktoe
2.15	Energy efficiency in the fisheries sector	555,6 ktoe
		<b>53.584,1 ktoe</b>

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 THE FULFILMENT OF THE ENERGY SAVINGS OBLIGATION

Article 7(10) of the Energy Efficiency Directive gives Member States two options to achieve the amount of cumulative end-use energy savings: either through an energy efficiency obligation scheme or by adopting alternative policy measures. It is also possible to opt for a combination of the two.

A combined system was adopted during the period 2014-2020 and will be maintained for the period 2021-2030, albeit with adjustments and new measures to achieve the ambitious final energy savings target of the current obligation period. The concrete proposal for action for this period is set out below:

### F.5.1. ENERGY EFFICIENCY OBLIGATION SCHEME

During the period 2021-2030, the **SNOEE** and, within it, the **FNEE**, both initiated by Royal Decree Law 8/2014 of 4 July approving urgent measures for growth, competitiveness and efficiency, and subsequently converted into Law 18/2014 of 15 October approving urgent measures for growth, competitiveness and efficiency, will remain in place. The aforementioned Law therefore transposes into Spanish law Article 7a on ‘Energy efficiency obligation schemes’ and Article

20 on EED “Energy Efficiency National Fund, Financing and Technical Support”. Royal Decree-Law 23/2020 of 23 June approving measures in the field of energy and in other areas for economic

recovery amended Law 18/2014 of 15 October, extending the validity of the SNOEE until 31 December 2030, in accordance with the revision of the provisions of Directive (EU) 2018/2002 amending the Energy Efficiency Directive.

Article 71 (2) of Law 18/2014 of 15 October empowers the Government to regulate a system of accreditation of final energy savings by issuing Energy Saving Certificates which, once in place, enable SNOEE subjects to meet all or part of their energy saving obligations at the lowest possible cost, by carrying out or promoting, directly or indirectly, energy efficiency actions in various sectors. These Energy Saving Certificates (PPAs) must 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 2012/27/EU on energy efficiency, so that they can subsequently be counted towards meeting the cumulative final energy savings target laid down in Article 7 of that Directive.

On 25 January 2023, Royal Decree 36/2023 of 24 January establishing a system of energy savings certificates was published. This new mechanism is expected to bring a qualitative and quantitative leap in achieving savings by SNOEE, in order to cushion the impact of the significant increase on the cumulative final energy savings target for the period 2021-2030.

#### ***a) Description of the energy efficiency obligation scheme***

For the period 2021-2030, the annual savings target, the percentages of **distribution of the annual savings target among the obligated persons**, as well as the resulting savings quotas or obligations and their **financial equivalence**, shall be **fixed annually by order of the head of the Ministry for the Ecological Transition and the Demographic Challenge, subject to the agreement of the Government Delegated Committee for Economic Affairs**.

The annual energy savings target to be determined shall be apportioned among the obligated persons, in the case of gas and electricity traders, proportionally to the volume of their final energy sales at national level to final consumers during the second year preceding the annual period of the obligation. For wholesale operators of petroleum products and liquefied petroleum gases, the volume of their final energy sales at national level for subsequent retail distribution and final consumers, during the second year preceding the annual obligation period.

Until the entry into force of the Energy Saving Certificates System (PPA System), obliged persons must demonstrate compliance with the share of energy savings allocated to them annually, also known as the annual savings obligation, making a financial contribution to the **EENF** by the amount obtained by multiplying their annual savings obligation by an established financial equivalence.

However, once this system becomes operational, SNOEE obligated persons who so wish will be allowed to contribute to the fulfilment of their annual savings obligation by submitting PPAs, respecting, in any case, a mandatory minimum contribution to the FNEE, which will be established annually by ministerial order.

Further details of both the EENF and the energy savings certificates are given below:

#### **National Energy Efficiency Fund**

The FNEE was established 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 Energy Savings

### Certificate System.

The EENF is dedicated to financing economic, financial, technical assistance, training, information, or other measures to increase energy efficiency, in the different energy-consuming sectors so as to contribute to the achievement of the national energy savings target set out in Article 7 EED.

Obligated persons must make an annual financial contribution to the EENF, by the amount obtained by multiplying their annual savings obligation by the financial equivalence to be established. This contribution shall be paid in four equal instalments per quarter, not later than 31 March, 30 June, 30 September and 31 December of each year.

Financial equivalence is determined annually by the owner of the Ministry for the Ecological Transition and the Demographic Challenge on the basis of the estimated average cost that makes it possible to mobilise the investments needed to carry out the energy saving and efficiency measures designed to achieve the annual energy savings target 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 2007 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 management of the Fund to the Institute for Energy Diversification and Saving (IDAE).

The Fund will continue to be endowed with:

- Contributions from persons obliged by the National Energy Efficiency Obligations System to meet or settle their savings obligations. Despite the entry into operation of the PPA system, and in order to ensure sufficient funding, the minimum percentage of their annual obligation that the obligated parties will necessarily have to pay through financial contributions to the fund will be established.
- Resources from the Community Structural Funds ERDF.
- Other contributions entered in the General State Budget.
- Any other resources intended to finance actions aimed at implementing final energy saving measures.

### Energy Saving Certificates (EPCs)

Article 7a of the Energy Efficiency Directive allows obligated parties to count towards their obligation certified energy savings achieved by **energy service providers or other** third parties, including where obligated parties promote measures through other state-authorized bodies 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 certification of energy savings is the result of a clear, transparent and open authorisation process for all market actors and aims at minimising the costs of certification.

On the basis of this provision, and as already stated, Law 18/2014 of 15 October 2007 empowers the Government to establish a mechanism for certifying the achievement of an amount of energy savings equivalent to compliance with the obligation to save under the obligation scheme, on the basis of the submission of Energy Saving Certificates (EPCs), resulting from the implementation of energy efficiency actions defined in a catalogue and meeting the

requirements and conditions to be established. Certificates are required to be subject to a control system that includes material verification of a statistically significant part of certified energy efficiency improvement measures.

In accordance with the above, and within the framework of the SNOEE, Royal Decree 36/2023 of 24 January 2007 establishing a system of energy savings certificates has been approved. This new system, in addition to helping to achieve the ambitious cumulative final energy savings target for the period 2021-2030, will enable:

- a) To make the way in which obliged parties meet their final energy saving obligations more flexible, allowing part of their annual obligation to be met by carrying out energy efficiency measures.
- b) Enable obligated parties to meet their obligations under the SNOEE at the lowest possible cost.
- c) Improve the efficiency of the SNOEE by facilitating the achievement of the national final energy savings target.
- d) To count the savings generated as a result of energy efficiency actions carried out by private entities, whether subject to SNOEE or not, 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) Providing the opportunity for final consumers 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, with final consumers themselves calling for energy efficiency measures.
- f) Generating 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.

It should therefore be noted that the objective pursued by this Royal Decree is not only to achieve annual savings in final energy consumption, but also to promote, throughout the national territory, an economy that uses resources more efficiently and is therefore more competitive, resulting, inter alia, in the decarbonisation and reduction of pollutant emissions in those sectors and in those territories where the different energy efficiency measures are carried out.

***b) Cumulative and annual amount of expected savings and duration of obligation period (s)***

The amount of savings planned annually and cumulatively attributable to the system of obligations and therefore to the persons subject to the obligation shall be **determined annually by the owner of the Ministry for the Ecological Transition and the Demographic Challenge, subject to the agreement of the Government Delegated Commission for Economic Affairs.**

***c) Obligated parties and their responsibilities***

In the period 2021-2030, the obligated persons to whom an annual share of energy savings will be allocated will continue to be:

- Gas and electricity trading companies.
- Wholesale oil product operators.
- Wholesale liquefied petroleum gas operators.

Although the Directive provides for the possibility for obliged parties to be 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 activity of managing the corresponding network, it has been established that energy traders are required to do so, 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 rather undertakings which market the products for sale to final consumers. In particular, and taking into account the atomisation in the final marketing of these products, wholesale operators of petroleum products and liquefied petroleum gases.

The share or annual savings obligation of each of the obligated persons 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 fulfil the annual energy savings obligations, the obligated parties must make an annual financial contribution to the EENF, to pay four equal payments during 2023, by 31 March, 30 June, 30 September and 31 December, by the amount obtained by multiplying their annual savings obligation by the corresponding financial equivalence.

With the entry into force of the PPA system, it is possible for part of the annual savings obligation to be met by submitting Energy Saving Certificates, always respecting a minimum financial contribution to the National Energy Efficiency Fund. This minimum contribution ensures that the EENF maintains an adequate envelope to finance both existing and already approved aid programmes, as well as the costs associated with the management of the fund itself.

#### ***d) Sectors addressed***

The sectors covered shall be all energy-consuming sectors, in accordance with the sectoral breakdown set out in section F.4.: transport, industry, residential, tertiary and agriculture and fisheries.

#### ***e) Eligible actions foreseen under the measure***

The CAE system for measure 2.19 is a system that applies horizontally to all sectors covered by the EAD in force and is set out in the table below.

The action programmes under the FNEE to be developed are those set out in the table below, which shows whether the measure had already been implemented in the period 2014-2020 and is therefore considered to be existing or, on the contrary, is a newly created measure:

**Table F.3. Action programmes under the EENF (2021-2030)**

ENERGY EFFICIENCY NATIONAL FUND		
Measure No.	SECTOR	Existing measure 2014-2020

<b>TRANSPORT</b>		
<b>2.1</b>	<b>Low-emission zones and sustainable urban mobility</b>	
	Plans for transport to the workplace (PTT) (co-management with Autonomous Communities)	EXISTING
	Public transport communication campaign	EXISTING
<b>23</b>	<b>Renewal of the rolling stock of means of transport by other means of transport efficient and improved management</b>	
	Fleet management systems (co-management with Autonomous Communities)	EXISTING
	Driving courses (co-efficient for professional drivers management with Autonomous Communities)	EXISTING
<b>INDUSTRY</b>		

<b>2.6</b>	<b>Improvements in technology and process management systems in non-energy intensive industries</b>	
	In SME (co-management with Autonomous Communities)	EXISTING
	In Large Enterprise (co-management with Autonomous Communities)	EXISTING
<b>2.7</b>	<b>Improvements in technology and process management systems in energy intensive industries</b>	
	In SME (co-management with Autonomous Communities)	EXISTING
	In Large Enterprise (co-management with Autonomous Communities)	EXISTING
<b>RESIDENTIAL</b>		
<b>2.8</b>	<b>Energy efficiency in existing buildings in the residential sector</b>	
	Housing sector: Energy renovation of dwellings (autonomous community co-management)	EXISTING
<b>2.9</b>	<b>Renewal of residential equipment</b>	
	Communication campaign home equipment	EXISTING
<b>SERVICES</b>		
<b>2.11</b>	<b>Energy efficiency in buildings in the tertiary sector.</b>	
	Buildings used in the tertiary sector: Energy renovation tertiary buildings (autonomous community co-management)	EXISTING
<b>2.13</b>	<b>Energy efficiency in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure</b>	
	Renovation plan for furniture for conservation and freezing (co-management with Autonomous Communities)	NEW
	Renewal of industrial and tertiary cold generators (co-management with Autonomous Communities)	NEW
<b>AGRICULTURE AND FISHERIES</b>		
<b>2.14</b>	<b>Energy efficiency on farms, irrigation communities and agricultural machinery</b>	
	Improvement of energy saving and efficiency in agricultural holdings (autonomous community co-management)	NEW
	Improvement of energy saving and efficiency in Irrigation Communities (Autonomous Community co-management)	NEW

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

In the case of the EENF, these are non-repayable aid programmes aimed at end-users in the industrial, transport, residential, services and agriculture and fisheries sectors. Together with communication campaigns for the transport (modal shift measures, with a particular focus on collective public transport) and residential (household equipment) sectors.

## F.5.2. ALTERNATIVE POLICY MEASURES

Article 7b of the Energy Efficiency Directive allows for the implementation of alternative measures (those outside the SNOEE framework) that contribute to the achievement of the final energy savings target. During the period 2014-2020, this route was used through the development of tax measures, regulations and aid 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 2021-2030 in the NECP for the different sectors. The details requested in Annex III to the Governance Regulation, such as the type of action measure, a brief description of the measure and the sectors addressed, are advanced.

Alternative measures can be grouped according to the executing public authority in the following types:

1. Voluntary agreements to be concluded between the State Secretariat for Energy with private companies (industry, fleet managers, residential equipment, energy service companies, etc.).
2. Aid programmes co-financed with ERDF funds or financed by local authorities: aimed at activities falling within the remit of the Local Authorities (Sustainable Urban Mobility, Buildings and Local Infrastructure) and General State Administration (AGE) (buildings and infrastructure).
3. Aid programmes with the General State Budget (General State Budget) and Next Generation EU funds under the Recovery, Transformation and Resilience Plan:
  - a. Aid programmes under Component 1 of the PRTR (MITECO MOVES and MITMA Aid Programmes).
  - b. Assistance programmes under PRTR Component 2 (PREE, PREE 5.000, DUS 5.000)
  - c. Energy Transition Plan AGE
  - d. MITMA State Housing Plan.
4. Legislation:
  - a. Law 7/2021, of 20 May, on Climate Change and Energy Transition, which includes various amendments to the existing legislation for the removal of barriers (Law on Horizontal Property, Labour Transport Plans, etc.).
  - b. Law on sustainable mobility and financing of public transport, as well as regional laws and municipal regulations relating to mobility.

The following table includes a list of alternative measures, indicating whether they existed in the period 2014-2020 and are maintained in the period 2021-2030 (identified as 'EXISTENTE') or whether they will be newly implemented in the period 2021-2030 (identified as 'NEW').



Table F.4. Alternative action programmes (2021-2030)

Measure d	ALTERNATIVE MEASURES OF ACTION		Existing measure 2014- 2020
	SECTOR	Type of measure	
<b>TRANSPORT</b>			
<b>2.1 Low-emission zones and sustainable urban mobility</b>			
	ERDF support programme 2021-2030 (DUS- municipalities) for the development of sustainable urban mobility plans	Public support (ERDF)	EXISTING
	Drafting of the Law on Sustainable Mobility and Public Transport Financing, as well as Autonomous Laws and Municipal Regulations in the 145 municipalities over 50.000 hours (52 % of the country's population). They will 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, the promotion of car-sharing, the promotion of cycling, the improvement and promotion of public transport, etc.	Legislative (regional and local)	NEW
	Development of the Law on Sustainable Mobility and Financing of Public Transport, with budget allocation (> EUR 50 million/year)	Legislative (AGE) + PGE	NEW
	Municipal Mobility Ordinances: implementation of traffic restriction measures and management of parking on public roads by municipalities with > 50.000 inhabitants, so as to penalise older vehicles with the highest consumption and pollutant emissions.	Legislative (Local)	NEW
	Draft Climate Change and Energy Transition Bill: amendment of Article 103 of Law 2/2011 on the sustainable economy ('Preparation of transport plans in undertakings'), requiring it to be implemented for companies with more than 250 employees (large companies) and to set up mobility coordinators for such companies.	Legislative (LCCyTE)	NEW
<b>2.3 Replacement of rolling stock for more efficient means of transport and improvements in management</b>			
	Voluntary Agreements for Fleet Management	Voluntary agreement	EXISTING
<b>2.3 Replacement of rolling stock for more efficient means of transport and improvements in management</b>			
	Amendment of the General Vehicle Regulation (RD 2822/1998): adoption of legislation to bring the masses and dimensions of national trucks into line with those in our surrounding countries. An increase in the maximum permissible mass to 44 tonnes and the height to 4.5 m;	Legislative	NEW

it will make it possible to increase the average load of such vehicles by 10 % from 2021, resulting in a reduction in the number of vehicles per kilometre and lower consumption for the same mass transported.		
Support programme for efficient and sustainable mobility incentives (MOVES II)	Public aid (PRTR)	NEW
MINCOTUR mobility aid programme	State aid (PGE)	EXISTING
<b>2.4 Promotion of electric vehicles</b>		
MOVES aid programme (Line authorised on an indefinite basis)	State aid (PGE)	EXISTING
MINCOTUR mobility aid programme	State aid (PGE)	EXISTING
MINCOTUR mobility aid programme	State aid (PGE)	EXISTING
Incentive programme for electric mobility (MOVES III)	Public aid (PRTR)	NEW
Programme of incentives for individual projects in electric mobility (MOVES Singulares II projects)	Public aid (PRTR)	NEW
Aid programme for projects to electrify light vehicle fleets (MOVES FLOTAS)	Public aid (PRTR)	NEW
<b>INDUSTRY</b>		
<b>2.6 Improvements in technology and process management systems in non-energy intensive industries</b>		
Voluntary Agreements Industry	Voluntary agreement	EXISTING
<b>2.7 Improvements in technology and process management systems in energy intensive industries</b>		
Voluntary Agreements Industry	Voluntary agreement	EXISTING
<b>RESIDENTIAL</b>		
<b>2.8 Energy efficiency in existing buildings in the residential sector</b>		

Aid programme Housing Plan – Ministry of Public Works (current MITMA)	State aid (PGE)	EXISTING
Energy renovation programme for existing buildings in municipalities of the Demographic Challenge (PREE 5000)	Public aid (PRTR)	NEW
<b>2.9 Renewal of residential equipment</b>		
Voluntary Agreement Manufacturers and Traders of Households (communication)	Voluntary agreement	NEW
<b>SERVICES</b>		
<b>2.11 Energy efficiency in buildings in the tertiary sector.</b>		
<b>2.13 Energy efficiency in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure</b>		
Support programme for the renovation of buildings and infrastructure ERDF 2021-2030 – AGE	Public support (ERDF + PGE)	EXISTING
Draft Climate Change and Energy Transition Bill: Extension of Article 5 of Directive 2012/27/EU to all public administrations (renovation of 3 % of the floor area of the Autonomous Communities and municipalities)	Legislative (LCCyTE)	NEW
Support programme for the renovation of buildings and infrastructure ERDF – municipalities	Public support (ERDF)	EXISTING
Aid programme for investments in specific local clean energy projects in municipalities of the Demographic Challenge (DUS 5000)	Public aid (PRTR)	NEW
Plan for Energy Transition in AGE	Public aid (PRTR)	NEW

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

### F.5.3. FISCAL MEASURES

Article 7b of the Energy Efficiency Directive allows the savings target to be achieved through alternative measures. These include taxation, which is developed in a separate paragraph, as indicated in Annex III of 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.5. Fiscal measures provided for in the NECP for the period 2021-2030**

ALTERNATIVE MEASURES (TAXATION)		
Measur ed	SECTOR	Existing measure 2014- 2020
<b>TRANSPORT</b>		
<b>2.3</b>	<b>Replacement of rolling stock for more efficient means of transport and improvements in management</b>	
	Future green tax reform led by the Ministry of Finance: the Ministry of Finance will analyse possible reforms associated with the automotive sector in order, inter alia, to meet the energy saving and efficiency target, as well as decarbonisation.	NEW
<b>2.5</b>	<b>Promotion of electric vehicles</b>	
	The Ministry of Finance in the framework of the future green tax reform to contribute to and accelerate the uptake of EVs in ES.	NEW
<b>RESIDENTIAL</b>		
<b>2.8</b>	<b>Energy efficiency in existing buildings in the residential sector</b>	
	The Ministry of Finance in the framework of the future green tax reform will analyse taxation in the residential sector in order to internalise the positive externalities of improving energy efficiency in buildings related to this sector.	NEW
	Law 10/2022 of 14 June 2012 on urgent measures to boost building renovation activities in the context of the Recovery, Transformation and Resilience Plan	NEW
<b>SERVICES</b>		
<b>2.11</b>	<b>Energy efficiency in buildings in the tertiary sector.</b>	
	The Ministry of Finance in the framework of the future green tax reform will analyse taxation in the tertiary sector in order to internalise the positive externalities of improving energy efficiency in buildings related to this sector.	NEW

*Source: Ministry of Ecological Transition and the Demographic Challenge, 2023*

#### **F.5.4. PRINCIPLES AND METHODOLOGY FOR CALCULATING ENERGY SAVINGS**

Annex V to Directive 2012/27/EU on energy efficiency sets out the common methods and principles for calculating the impact of energy efficiency obligation schemes or other policy measures under Articles 7, 7a and 7b and Article 20(6). In other words, it sets out the methodology and principles for calculating energy savings from the SNOEE and alternative measures.

For its part, Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of energy savings obligations under the Energy Efficiency Directive expresses the European Commission's view on how Articles 7, 7a, 7b, 20.6 and the aforementioned Annex V are to be understood and applied.

At national level, and in order to ensure compliance with Annex V to Directive 2012/27/EU, the Resolution of 22 December 2022 of the State Secretariat for Energy approving the principles and methodology to be taken into account for accounting for final energy savings has been published, in accordance with Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency<sup>198</sup>.

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 end of the implementation of the energy efficiency action, and it is therefore the moment they should start counting.
2. Savings should be accounted for throughout the lifetime (declared or based on statistical data) of the energy efficiency action, with a maximum of up to 31 December 2030 to ensure the imperviousness of the obligation periods.
3. Where appropriate, the reduction in energy savings over the lifetime of each measure should be taken into account (rate of decrease, which may or may not exist and vary depending on the type of measure or action).
4. For the purposes of accounting for savings generated by a given action, account must be taken of the existence of applicable regulations or regulations relating to eco-design. In such cases, the baseline from which savings are to be calculated is the minima required by those rules or regulations.
5. Actions resulting from measures/calls from the previous obligation period (2014-2020) may be accepted, provided that they result in new actions within the current obligation period 2021-2030 (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 as there may be policy overlaps as a result of the parallel use of SNOEE and alternative measures, or of overlap between policies of different administrations.

---

<sup>198</sup>[https://www.boe.es/eli/es/res/2022/12/22/\(5\)](https://www.boe.es/eli/es/res/2022/12/22/(5))

## 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 the integrated national energy and climate plans (NECPs) during their preparation to a public information process. As this process was successfully developed during the preparation of the initial NECP, it is being developed during this process of updating the NECP.

When carrying out public consultations, and in line with the Aarhus Convention, Member States should aim to ensure equal participation, that the public is informed by public notices or other appropriate means such as electronic media, that the public is able to access all relevant documents, and that practical arrangements related to the public's participation are put in place. It should be possible for the Member State's integrated national energy and climate plan as well as its long-term strategy to be discussed within the framework of that dialogue.

To date, as part of the overall public consultation process for updating the NECP, the following participation process has taken place:

- First, a preliminary **public consultation process took place in August and September 2022** to ensure that Spanish society as a whole is informed, involved and put forward its proposals on the NECP. More than 2.000 contributions have been received during the consultation from more than 120 different actors, most of them associations and businesses, but also from the public and academic sector, among others.
- More recently, "**working days for the update of the integrated national energy and climate plan**" have taken place 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 participating in the prior public consultation.
- Another process of submission, participation and consultation is **this public hearing and information to which this draft is submitted**. The purpose of the public consultation process is to ensure that Spanish society as a whole is informed, involved and expressed its views on the initial draft, and taken into account for the preparation of the final plan.

### PRIOR PUBLIC CONSULTATION FOR THE UPDATE OF THE INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN

The purpose of the prior public consultation process is to enable Spanish society as a whole to make proposals to be taken into account when drawing up the draft plan.

In the process of preparing this draft of the first update of the **NECP199**, a **public consultation** was held between 2 August and 15 September 2022. It called on the participants to provide the necessary input on the updating of the policies and measures contained in the 2021-2030 NECP currently in force. To this end, a summary table containing the measures grouped by size, where contributions could be made, was made available to the participants.

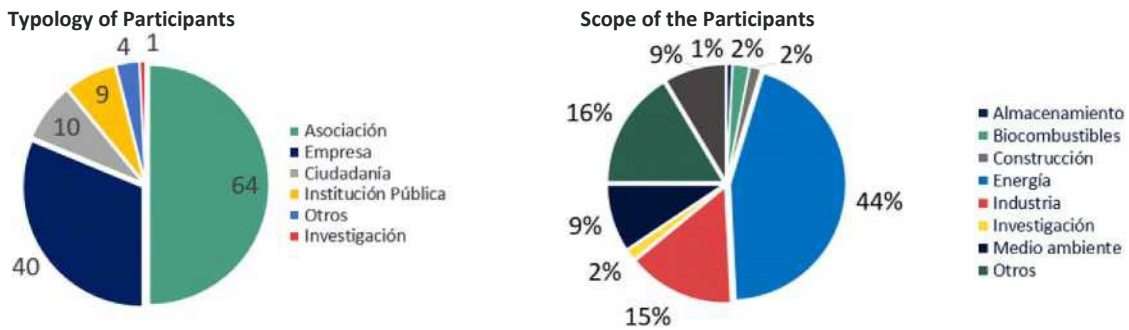
A total of 2.071 comments have been received from 128 different actors. Most of the actors that participated in the public consultation belong to: associations (64), followed by companies (40), private individuals (10), public administrations (9) and scientific and academic stakeholders (1).

---

<sup>199</sup><https://energia.gob.es/es-es/participacion/paginas/DetalleParticipacionPublica.aspx?k=540>

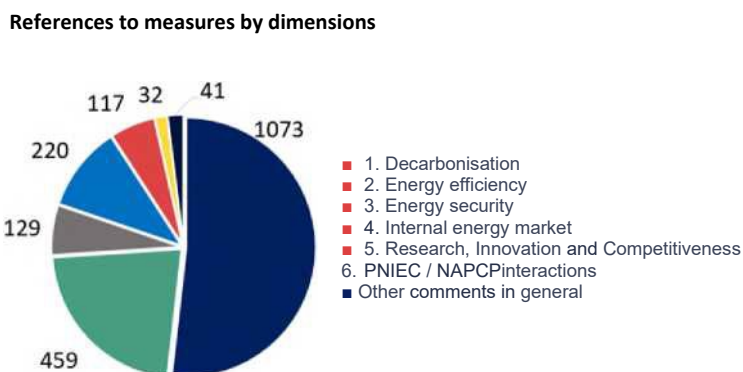
As regards the sectoral scope of the participants, 44 % are in the energy sector, 15 % in the industrial sector, 9 % in the environmental and transport sectors, and less than 2 % in research, storage, biofuels and construction (see Figure G.1).

**Figure G.1. Classification of agents by typology and scope**



Source: Ministry of Ecological Transition and the Demographic Challenge, 2023

With regard to the comments received by size, Decarbonisation corresponds to 1.073, Energy Efficiency 459, Energy Security 129, Internal Energy Market 220 and Research for Innovation and Competitiveness 117. Furthermore, as regards interlinkages between the NECP and other plans (in particular with the NAPCP), there are 32 comments and 41 comments qualified as other or cross-cutting. (see Figure G.2).

**Figure G.2. Classification of inputs according to dimensions**

## WORKING DAYS FOR UPDATING 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. The event was attended by a large number of organisations representing the sectors concerned and interested in 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, etc.; market monitoring and operation organisations; representatives of industry, agriculture, construction, energy efficiency, transport, research and development, among others.

The workshops were organised into a total of 14 working tables made up of representatives of the various sectors mentioned above. They also involved the public who had the opportunity to express their views, contributing to the debate, and also participate in rounds of questions and answers, thus creating a forum for discussion among 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.

**Table G.1. Programme of the Working Days for the Update of the National Integrated Plan of Energy and Climate**

### WORKING DAYS FOR UPDATING THE INTEGRATED NATIONAL PLAN OF ENERGY AND CLIMATE.

**27 April 2023**

#### **Session 1: Review process and definition of objectives of the NECP**

Welcome and opening. Revision process of the NECP.

Bureau 1: Revision of the NECP targets in the context of the 'Fit for 55' package.

Bureau 2: Dimension Decarbonisation.

Bureau 3: Energy Efficiency dimension.

Bureau 4: Internal Market dimension.

Bureau 5: Energy Security dimension

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 Claim  
 Closure and conclusions

### **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, understood as a prevention instrument enabling environmental aspects to be integrated into the decision-making of public plans and programmes. To this end, a Strategic Environmental Study is being prepared and one of the main objectives of this law – **public participation** – will be consulted, the results of which will be taken into account in the drafting of the law.

In accordance with the aforementioned Law, the environmental body will process the procedure and submit for consultation with the public administrations concerned and interested persons the draft update of the NECP and the Strategic Initial Document, the list of entities consulted being accessible to the public on the MITECO website. Once the responses to the consultations have been received, the environmental body will draw up the Strategic Environmental Study Scope Document, which will also be made public on MITECO's website.

Thus, once the **Strategic Environmental Study** has been carried out, it will be subject to public consultation accompanied by the **updated version** of the 2023-2030 PNIEC, as well as a non-technical summary of that study, following an announcement in the Official State Gazette.

In addition, following the recommendations of the DAE, working groups have been set up to draw up **information guides to good practice** that systematise all environmental criteria, including the possibility of proposing common criteria to serve as a reference for regional legislation and the respective municipal regulations. Details of this work are set out in Chapter 3.6.1.

## ANNEX H. INTERACTIONS WITH OTHER PLANS AND PROGRAMMES

The NECP defines the targets for reducing greenhouse gas emissions, penetration of renewable energy and energy efficiency. The importance of the National Plan and its strong environmental and social implications mean that there are many planning instruments with which it interacts.

Below is an analysis of the interlinkages between the PNIEC and the main sectoral and territorial planning instruments (strategies, plans and programmes) that 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 tools have been organised for the different environmental aspects:

- Climate change and air quality
- Geology and soils
- Inland water and aquatic systems
- Biodiversity (flora, fauna, habitats), protected natural areas and Natura 2000
- Marine environment
- Cultural heritage and landscape
- Land use, social and economic development
- Energy and industry
- Transport, mobility and housing
- Waste
- Population, public health and material goods
- Research & innovation

It should be noted that although some of the planning instruments are old or close to the end of their period of validity, they have been included in the analysis as they form the basic background and have been setting environmental protection objectives in the various sectors.

## 1. Climate change and air quality

Instrument for planning	Objectives and/or prescriptions of the instrument of planning with which you can interact with	Significant interactions of the NECP with the objectives of the planning instrument
<b>National Climate Change Adaptation Plan (PNACC) 2021-2030</b>	<p>The PNACC, adopted in 2006, aims to achieve the integration of climate change adaptation measures based on the best available knowledge in all sectoral and natural resource management policies that are vulnerable to climate change, in order to contribute to sustainable development throughout the twenty-first century. The process of drawing up a new National Adaptation Plan (PNACC-2) for the period 2021-2030 began in 2019.</p> <p>The Plan is conceived as a continuous and cumulative process of knowledge generation and capacity building and capacity building to implement them.</p> <p>It establishes the reference framework for coordination between public administrations in the assessment of impacts, vulnerability and adaptation to climate change in Spain.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the PNACC.</p> <p>The NECP is synergistic with the NAPCP, especially in its research, innovation and competitiveness dimension, as it drives improved knowledge on energy and climate change. It specifically envisages (in the context of the Spanish Science and Technology Strategy 20212027) the incorporation of a Strategic Action on Climate, Energy and Mobility (Measure 5.1) and to allocate a volume of funding for R &amp; I + c on energy and climate change risks.</p>
<b>Spanish Strategy for Change Climate and Energy Clean (EECCYEL) 2007-2012-2020</b>	<p>The Spanish Strategy for Climate Change and Clean Energy (EECCYEL) aims to meet Spain's commitments on climate change and promote clean energy, while improving social welfare, economic growth and environmental protection.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with EECCYEL.</p> <p>The NECP reinforces the drive for clean energy, as the measures envisaged will bring about 48 % renewables in the final use of energy and 81 % renewable energy in electricity generation by 2030. In addition, it will drive a significant increase in energy efficiency, thus achieving neutrality in Spain's GHG emissions by 2050.</p>
<b>II National Emission Reduction Programme</b>	<p>The purpose of the NERP is to promote the measures necessary to approximate compliance with the national emission ceilings established by Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants:</p> <ul style="list-style-type: none"> <li>- Sulphur dioxide SO<sub>2</sub>: 746 kt</li> <li>- Oxides of nitrogen NO<sub>x</sub>: 847 kt</li> <li>- Non-methane volatile organic compounds (NMVOC): 662 kt</li> <li>- Ammonia NH<sub>3</sub>: 353 kt</li> </ul>	<p>On the other hand, the NECP will contribute to social welfare, as it has health benefits (reduction in the number of premature deaths due to air pollution) and the energy economy of the population.</p> <p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the NERP.</p> <p>One of the relevant results presented in the NECP is the penetration of renewable energies and the progressive reduction of electricity production from fossil fuels (decarbonisation dimension), leading to a reduction in pollutant emissions into the air.</p> <p>In addition, the NECP (energy efficiency dimension) contributes to the reduction of emissions in the diffuse non-energy sectors (agriculture, livestock, forest sinks, waste management, fluorinated gases) and energy diffuse sectors (residential, commercial and institutional, transport and industry not subject to emission allowances).</p>

Instrument planning	Objectives and/or prescriptions of the instrument planning with which you can interact with <small>NECP</small>	Significant interactions of the NECP with the objectives of the planning instrument															
<p>Programme I NACIONAL de control de contaminación atmosférica Atmosfera (NAPCP)</p>	<p>The National Air Pollution Control Programme is a continuation of the PNRE and sets out a number of sectoral and cross-cutting measures, in line not only with national air quality policies, but also with the energy and climate policies defined in the National Integrated Energy and Climate Plan 2021-2030 (NECP), in which they set out the new commitments.</p> <p>nationally reducing anthropogenic emissions of sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NOX) from methane volatile organic compounds (NMVOC), ammonia (NH<sub>3</sub>), and fine particulate matter (PM<sub>2,5</sub>). reference 2005:</p> <table border="1"> <thead> <tr> <th></th> <th>SO<sub>2</sub></th> <th>NOX</th> <th>NMVOC</th> <th>NH<sub>3</sub></th> </tr> </thead> <tbody> <tr> <td><b>2020-2029</b></td> <td>67 %</td> <td>41 %</td> <td>22 %</td> <td>3 %</td> </tr> <tr> <td><b>From 2030</b></td> <td>88 %</td> <td>62 %</td> <td>39 %</td> <td>16 %</td> </tr> </tbody> </table>		SO <sub>2</sub>	NOX	NMVOC	NH <sub>3</sub>	<b>2020-2029</b>	67 %	41 %	22 %	3 %	<b>From 2030</b>	88 %	62 %	39 %	16 %	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its new objectives and measures are in line with the NAPCP.</p> <p>One of the relevant results presented in the NECP is the penetration of renewable energies and the progressive reduction of electricity production from fossil fuels (decarbonisation dimension), leading to a reduction in pollutant emissions into the air.</p> <p>In addition, the PNCAA (efficiency dimension energy) contributes to reducing emissions in diffuse non-energy sectors (agriculture; livestock farming, forest sinks, waste management, fluorinated gases) and in diffuse energy (residential, commercial and institutional, transport and industry not subject to emission allowances).</p> <hr/> <p>The NECP is in line with the AIRE II Plan. Some of the measures in the NECP contribute to an improvement in air quality. Overall, the decarbonisation dimension provides for a major development of renewable energies, coupled with a progressive decrease in electricity production from fossil fuels, and the dimension of energy efficiency leads to a reduction in consumption. This leads to a reduction in pollutant emissions into the air and an improvement in air quality. Some particular measures highlighted are:</p> <ul style="list-style-type: none"> <li>- Measure 1.33. Reduction of GHG emissions in waste management</li> <li>- Measure 1.34. Reduction of GHG emissions related to fluorinated gases</li> <li>- Measure 1.35. Forest sinks</li> <li>- Measure 1.36. Agricultural sinks</li> </ul> <p>In addition, energy efficiency measures (especially in transport and buildings) lead to reduced pollution and improved air quality in urban and peri-urban, particularly populated areas. According to the health impact analysis carried out in the NECP, the implementation of its measures will result in a reduction of more than two thousand premature deaths in 2030, with the corresponding significant economic benefits in terms of public health.</p>
	SO <sub>2</sub>	NOX	NMVOC	NH <sub>3</sub>													
<b>2020-2029</b>	67 %	41 %	22 %	3 %													
<b>From 2030</b>	88 %	62 %	39 %	16 %													
<p>AIRE National Quality Plan 2017-2019 (Air Plan II)</p>	<p>This plan was approved on 15 December 2017. Its objectives include putting in place general measures to help reduce the levels of emissions into the air of the most relevant pollutants with the greatest impact on health and ecosystems, especially in the areas most affected by pollution.</p>																

Objectives and/or prescriptions of the Instrument planning with which you can interact with NECP	Significant interactions of the NECP with the objectives of the planning instrument
--	--

This plan was approved on 9 July 2021. The plan sets uniform values and actions for all administrations, so that responses to the **Framework Plan of pollution alert situations and actions** which could be put in place are similar for each **time limit in case of one of the levels of action**, regardless of the **episodes of discharge** geographical scope. The Royal was approved in January 2023. **pollution** Decree 34/2023 amending the Royal Decree 102/2011, together with other environmental standards, to incorporate the provisions of the Short-term Framework Action Plan in the event of high-pollution events.

The NECP is in line with the short-term Framework Plan for Action in the event of high-pollution events. Overall, the decarbonisation dimension aims at reducing pollutant emissions to the air, while the energy efficiency dimension leads to a reduction in energy consumption and thus in emissions pollution.

Some particular measures that stand out, and are in line with the Framework Plan, are:

- Measure 1.11. Framework for the development of renewable thermal energy.
- Measure 1.33. Reduction of GHG emissions in waste management.
- Measure 2.1. Low-emission zones and modal shift measures.
- Measure 2.2. Modal shift in freight transport with a greater presence of rail.

In addition, energy efficiency measures (especially in transport and buildings) lead to reduced pollution and improved air quality in urban and peri-urban, particularly populated areas. According to the health impact analysis carried out in the NECP, the implementation of its measures will result in a reduction of more than two thousand premature deaths in 2030, with the corresponding significant economic benefits in terms of public health.

## 2. Geology and soils

Instrument for planning	Objectives and/or prescriptions of the instrument planning with which you can interacting the NECP	Significant Interactions of the NECP with the objectives of the instrument of planning
National priority action plan on hydro-forestry restoration, erosion control and defence against desertification (PNAP).	<p>It is the general framework for carrying out work to restore, preserve and improve protective plant cover. Its objectives include controlling erosion, improving water regime and regulating flow rates and maintaining and improving the protective function of forests on soil and water resources, among others.</p> <p>The PNIEC is in line with the PNAP, since its measures include hydro-forestry restoration in areas at high risk of erosion. It also contributes to</p>	<p>the fight against climate change (through increased carbon sinks), avoiding in the long term the rise of desertification.</p> <p>In this regard, measure 1.35 forest sinks, which includes actions such as the creation of wooded woodland, forestry and controlled grazing to prevent forest fires, as well as hydrological and forest restoration in areas at high risk of erosion, among others.</p>
ActionProgramme National against Desertification (NDP)	<p>The elaboration and development of the National Programme of Action against Desertification (NPAD) is our main obligation as a signatory to the UN Convention to Combat Desertification. Desertification (CLD). It envisages the development of preventive, rehabilitation, research, education and public awareness actions in the fight against desertification. It aims to contribute to the sustainable development of the affected areas of the national territory and, in particular, the prevention of land degradation and the restoration of deserted land. The measures</p>	<p>provided for in the NECP are in line with the NDP. Similarly, NDP measures contribute to increasing CO<sub>2</sub> sinks and benefit the fight against climate change.</p> <p>In this regard, measure 1.35 on 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.</p>
The NationalStrategy to Combat Desertification (ENLD)	<p>The document sets out objectives and principles, analyses the policies that have the greatest impact on desertification, draws up a diagnosis of the situation in Spain (causes, impacts, main desertification scenarios and SWOT analysis) and proposes measures and actions to improve governance in the fight against desertification and promote land management that prevents land degradation.</p> <p>The measures provided for in the NECP are in line with the ENLD. Similarly, ENLD measures contribute to increasing CO<sub>2</sub> sinks and benefit the fight against climate change.</p>	<p>In this regard, measure 1.35 on 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.</p>

### 3. Inland water and aquatic systems

Instrument for planning	Objectives or requirements of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>Hydrological Plan National (PHN)</b></p>	<p>The National Hydrological Plan in force was approved by Law 10/2001 of 5 July 2003, 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.</p> <p>It is the instrument that integrates the various relevant demarcation plans in order to achieve a harmonious and coordinated use of water resources. The NRP contains the coordination measures and the solution to possible discrepancies between different RBDs, uses and uses for the supply of populations or irrigation, and anticipation and conditions for transfers of water resources. It also contains the delimitation and characterisation of groundwater bodies shared between two or more RBDs, including the allocation of resources to each of them.</p>	<p>The development of the measures of the NECP does not foresee any relevant interactions with the PHN. In any case, the location of future hydropower uses must comply with the objectives of the PHN.</p>
<p><b>River basin management plan. WFD third cycle (2022-2027)</b></p>	<p>The general objectives of the River Basin Management Plans are to achieve good status and adequate protection of public water resources (DPH) and water, meeting water demands, balancing and harmonising regional and sectoral development, increasing resource availability, protecting its quality, economising its use and rationalising its uses in harmony with the environment and other natural resources.</p> <p>The transposition into Spanish law of Directive 2000/60/EC of 23 October 2009 establishing a framework for Community action in the field of water policy (WFD) has meant that, in addition to the above-mentioned objectives, good status in the water bodies in the river basin (understood as the achievement of environmental objectives therein) is an objective of planning and introducing the principle of recovery.</p>	<p>River basin management plans may lead to limitations on hydraulic use (although the NECP provides for a very limited increase in water use). In any case, the protection of HPD and the status of water bodies should be taken into account.</p> <p>Hydroelectric and hydraulic pumping installations may involve alterations to water bodies (hydromorphology and quality), affecting the achievement of the objectives of the WFD and the management plans. The measures in the NECP must be aligned with the objectives of these plans. The measures in the NECP that must take into account river basin management plans in their development include:</p> <ul style="list-style-type: none"> <li>- Measure 1.1 Renewable energy development compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2 Development of renewable energy compatible with the territory and rural development</li> <li>- Measure 1.3. Development of new electricity-generating installations using renewable energy</li> <li>- Measure 1.4. Development of innovative technology facilities</li> <li>- Measure 1.7. Adaptation of electricity grids for the integration of renewables</li> <li>- 1.9 development of new capacity for hydraulic energy storage</li> <li>- Measure 1.17. Repowering plan and procurement of existing renewable electricity generation projects</li> <li>- Measure 1.35. Forest sinks</li> </ul> <p>On the other hand, climate change has direct effects on water resources, so the measures developed under the NECP to mitigate the impacts of climate change will be in line with the objectives of the hydrological plans.</p>

Instrument for planning	Objectives or requirements of the planning instrument with which can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
Inflation Management (PGRI)	<p>The overall objective of the management plans is to ensure that the existing flood risk is not increased and, where possible, reduced by coordinated action by public administrations and society. To this end, different programmes of measures are carried out, which should take into account all aspects of risk management, focusing on prevention, protection and preparedness, including flood forecasting and early warning systems, and taking into account the characteristics of the</p>	<p>Flood risk management plans should include river restoration measures and measures for hydro-forestry restoration of river basins.</p> <p>The NECP provides an opportunity for the development of these measures, since in the Measures:</p> <p>Measure 1.9 Development of new hydroelectric energy storage capacity 1.35 forest sinks include hydro-forestry restoration actions and plantations in flood areas.</p>
Environmental Promotion Plan for Adaptation to Climate Change in Spain (PIMA – Adapta-AGUA)	<p>the catchment area or sub-basin considered, and the potential effects of climate change.</p> <p>This plan aims to improve the knowledge and monitoring of the impacts of global change and climate change in the area of water resources, minimising its risks and increasing the system's resilience to climate change. The projects and actions of the Adapta-AGUA PIMA are carried out along four strategic lines:</p> <ul style="list-style-type: none"> <li>- Measures for the management and adaptation of river nature reserves (RNF).</li> <li>- Adaptation to extreme events.</li> <li>- Assessment of the impact of climate change on water resources and development of adaptation strategies.</li> <li>- Development of climate change adaptation projects in the public water domain.</li> </ul>	<p>On the other hand, the measures proposed in the NECP will help mitigate the effects of climate change in the long term, thus supporting flood risk management plans.</p> <p>In the territorial development of the PNIEC, no interference is foreseen with the Inland Natural Reserves, in which the PIMA-Adapta-AGUA Plan provides for management and adaptation actions.</p> <p>On the other hand, the measures proposed in the NECP will help mitigate the effects of climate change in the long term, thus supporting flood risk management plans.</p>
cause disturbance to rivers, affecting the achievement of the WFD objectives.	<p>The overall objective of the Strategy is to promote the current management of rivers in order to achieve good ecological status in accordance with the Water Framework Directive, integrating river ecosystem management into land use and land management policies, among others.</p>	<p>The development of the measures of the NECP could affect river systems, so the approach of the National Strategy for the Conservation of Rivers should be taken into account.</p> <p>Hydroelectric and hydraulic pumping installations may cause disturbance to rivers, affecting the achievement of the WFD objectives. Among the measures in the NECP that must be taken into account in its development are:</p> <ul style="list-style-type: none"> <li>- Measure 1.3. Development of new electricity-generating installations using renewable energy</li> <li>- Measure 1.4. Development of innovative technology facilities</li> <li>- Measure 1.7. Adaptation of electricity grids for the integration of renewables</li> <li>- Measure 1.9. Development of new hydroelectric energy storage capacity</li> <li>- Measure 1.17. Plan for repowering and developing existing renewable electricity generation projects</li> </ul>



Instrument for planning	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<b>Strategic Plan for Wetlands at 2030</b>	<p>It responds to Spain's obligations as a member of the Ramsar Convention on Wetlands 'Strategic Plan Ramsar 2016-2024'. The Plan is the framework instrument that integrates all sectoral policies while seeking to coordinate control actions of form compatible with the preservation of these ecosystems.</p> <p>It is rational conservation and use objectives that restoration and the necessary integration preservation of these in sectoral of policies ecosystems affects.</p>	<p>Wetlands are relevant ecosystems for climate change mitigation as a source of CO<sub>2</sub> absorption.</p> <p>The NECP does not provide for the development of actions in wetlands or likely to affect wetlands. At in any event, account must be taken of the conservation of these habitats and of the associated aquatic avifauna.</p> <p>The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and aquatic ecosystems, linked to the 2030 Wetlands Strategic Plan.</p>

#### 4. Biodiversity (flora, fauna and habitats), protected natural areas and Natura 2000 network

<p><b>Strategic Plan for Natural Heritage and Biodiversity 2030</b></p> <p>HYPERLINK "https://www.miteco.gob.es/es/cambio-climatico/publicaciones</p>	<p>The Strategic Plan for Natural Heritage and Biodiversity as at 2030 is the key element for the development of Law 42/2007 on Natural Heritage and Biodiversity. Its overall objective is to halt the loss of biodiversity and the degradation of ecosystem services and to address their restoration.</p> <p>The Plan sets out a concrete vision for the present and future conservation of natural heritage and biodiversity in Spain by defining targets, objectives and actions that promote their conservation, sustainable use and restoration and sets out a coherent planning model. Conservation of biological diversity, sustainable use of components of biological diversity; the fair and equitable sharing of benefits arising from the utilisation of genetic resources.</p> <p>Strategies are currently in place for 17 species: Iberian imperial eagle, Cerceta pardilla (Focha and Malvasía), Iberian Desman, Lapa ferrugínea, Iberian Lince, Lobo, Náyade augarada, Oso pardo cantábrico, Oso brodo de los Piréneés, Pardela blonese, Quebrantabone, Urogallo cantábrico, Urogallo pirenaico, Visón Europa, nacra, marine Tortugas and Asteparias.</p> <p>The content includes: the identification of the species or threat addressed; the geographical scope of application; a description of the existing limiting or threat factors; the evaluation of the actions carried out; a diagnosis of the conservation status (for species); the aims to be achieved, with quantifiable targets; the criteria for delineating critical areas; the criteria for reconciling requirements for species with land uses and uses; recommended actions to eliminate or mitigate threats; and the frequency of updating.</p>	<p>The development of renewable energies provided for in this NECP must be compatible with the criteria and objectives set in relation to natural heritage and biodiversity.</p> <p>Some of the measures provided for in the NECP may have an impact on biodiversity and natural heritage. Undesirable effects arising primarily from the development of new renewable electricity generation facilities, electricity distribution infrastructure and storage systems shall be minimised.</p> <p>The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, linked to the HYPERLINK "https://www.miteco.gob.es/es/agua/temas/planificacion-hidrologica/planificacion-hidrologica/Plan_hidrologico_Nacional.aspx" Strategic Plan for Natural Heritage and Biodiversity.</p> <p>On the other hand, the NECP includes measures that are expected to have a very positive effect on biodiversity, soil and the protection of the hydrological cycle. The following are highlighted:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural</li> </ul> <p>The development of the measures of the NECP must not interfere with the territories of species subject to 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.</p> <p>The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, linked to endangered species, especially those with specific conservation strategies. These measures include:</p> <p>Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection EAE of the NECP.</p>
---	--	---

Instrument for planning	Objectives or requirements of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
-------------------------	--	---

the Instrument of	Objectives and/or prescriptions of planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
Spanish Plant HYPERLINK "https://www.miteco.g	<p>The strategy responds to Spain's commitment to the Global Plant Conservation Strategy of the United Nations Convention on Biological Diversity.</p> <p>It is the framework strategy for the coordination of plant conservation policies and actions. It seeks to promote, through objectives, objectives and principles of action, the coordination of plant conservation policies and actions, and to channel the participation of stakeholders.</p>	<p>When implementing the measures provided for in the NECP, pressures and disturbances on the plant communities and species of interest must be avoided, in line with the Spanish Strategy for Plant</p> <p>Some of the measures provided for in the NECP may have an impact on biodiversity and natural heritage. Undesirable effects arising primarily from the development of new renewable electricity generation facilities, which require considerable land take, should be minimised.</p> <p>The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, especially linked to vegetation, such as:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> </ul>
National State Strategy for Green and Connectivity and HYPERLINK "https://www.miteco.	<p>Green Infrastructure is an 'ecologically coherent and strategically planned network of natural and semi-natural areas and other environmental elements, designed and managed for the conservation of ecosystems and the maintenance of the services they provide to us. Includes spaces and other physical "green" elements in terrestrial (natural, rural and urban) and marine areas".</p> <p>It regulates the establishment and development of Green Infrastructure in Spain, establishing a harmonised administrative and technical framework for the whole of Spain, including maritime waters under national sovereignty or jurisdiction.</p>	<p>Measure 1.2. Development of renewable energy compatible with the territory and rural development</p> <p><u>Measure 1.35. Forest sinks</u></p> <p>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 managed for ecosystem conservation and maintenance of services.</p> <p>they provide us with them.</p> <p>The document 'Scientific and technical bases for the State Strategy for Green Infrastructure and Green Connectivity and Restoration' (which is a document of a scientific and technical nature) includes a conceptual framework, a legislative framework and a diagnosis, relating to connectivity, which may be of interest in planning the location of actions (essentially those arising from new electricity generation facilities).</p> <p>The NECP is mediated in line with this strategy, such as:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> </ul> <p>Measure 1.35. Forest sinks Measure 1.36. Agricultural sinks</p>

Instrument for	Objectives or requirements of the planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
Spanish Forestry Plan (CFP) 2022-2032	<p>Implementing Law 43/2003 on Forestry. It is the overall framework for forestry policy, compatible with socio-economic, cultural, political and environmental conditions. It contains a number of objectives, including: promote the protection of the territory in general, and of woodland in particular, from the action of soil erosion and soil degradation processes by restoring the protective plant cover and its complementary actions, extending the wooded area for protection purposes. At the same time, increasing carbon sequestration in forest biomass to help mitigate climate change.</p>	<p>change mitigation. In addition, they allow for the revitalisation of the rural environment and mitigate the risk of depopulation, also contributing to a just transition.</p> <p>Some measures in this regard include:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> <li>- Measure 1.21. Specific programmes for biomass harvesting</li> <li>- Measure 1.35. Forest sinks</li> </ul>
Forestry Strategy Spanish 2015 horizon 2050	<p>It is the framework for forest management and forest harvesting. Its objectives include integrating the territory and the forestry economy into the environment and the rural economy; balancing the management of the uses of the woodland, ensuring its sustainability and stepping up the protection and defence of the woodland against the various agents likely to cause damage to the woodland.</p> <p>Various measures in the NECP are in line with and strengthen the Spanish Forestry Plan, as regards the creation of wooded afforested areas, forest fire prevention, coniferous management or hydro-forestry restoration in areas at high risk of erosion, which in turn contribute to climate</p>	<p>The measures in the PNIEC for the restoration of forest stands are in line with the Spanish Forest Strategy. However, measures in the NECP that may affect forest areas will be carried out in accordance with the relevant forest resource management plans and under the premise of forest conservation and protection. These include:</p> <ul style="list-style-type: none"> <li>Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> <li>Measure 1.21. Specific programmes for biomass harvesting</li> <li>Measure 1.35. Forest sinks</li> </ul>
National HYPERLINK " <a href="https://www.fomento.gob.es/recursos_mfom/pdf/39711141-E3BB-49C4-A759-">https://www.fomento.gob.es/recursos_mfom/pdf/39711141-E3BB-49C4-A759-</a>	<p>This Plan accounts for removals from the national forest mass and proposes a forest reference level (FRL) for the periods from 2021 to 2025 and from 2026 to 2030.</p>	<p>The NECP contributes to the adaptation and construction of forest resilience to climate change of forest sinks, which contributes to the achievement of the objectives of the Forestry Accounting Plan for Spain and therefore reinforces its objectives. Measures that influence this are:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> <li>- Measure 1.21. Specific programmes for biomass harvesting</li> <li>- Measure 1.35. Forest sinks</li> </ul>
Spanish Strategy for the Conservation and Sustainable Use of Forest Genetic Resources 2006	<p>It is the working framework for the support, development and coordination of forest genetic conservation and improvement activities and programmes, which facilitates cooperation and integration of initiatives carried out by different administrations and agencies. The final objective of the Strategy is the conservation and sustainable use of forest genetic resources in Spain, preserving their capacity to evolve and ensuring their use for future generations.</p> <p>The gas emission reduction measures set out in the NECP contribute positively to the good environmental status of forests and therefore strengthen their objectives. In addition, the NECP contributes to curbing climate change and its effects (floods, desertification, deforestation, etc.).</p> <p>Measures that influence this are:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and</li> </ul>	<ul style="list-style-type: none"> <li>ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> <li>- Measure 1.21. Specific programmes for biomass harvesting</li> <li>- Measure 1.35. Forest sinks</li> </ul>

Instrument of	Objectives and/or prescriptions of the planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
<b>Phenological Monitoring Programme of the Spanish Biosphere Reserves Network</b>	<p>The Phenological Monitoring Programme of the Spanish Biosphere Reserves Network is an educational project for citizen science aimed at students, educators, naturalists, scientists and interested individuals. It aims to convey the values of the Biosphere Reserves and to motivate the study and observation of nature as a basis for scientific knowledge and method.</p> <p>The participation mechanism consists of continuous monitoring of common species of fauna and flora in the reserves of the biosphere, in order to analyse long-term changes (advances or delays) at the dates when the biological events characterising the species studied take place: migrations, flowering, reproduction, etc.</p>	<p>climate change by observing phenological changes in biosphere reserves.</p> <p>The NECP, especially in Measure 1.29. Knowledge generation, dissemination and awareness raising, synergies with the phenological monitoring programme, in terms of outreach and citizen participation.</p>
<b>Master Plan for National Parks</b>	<p>The Plan sets out the basic guidelines for the planning, conservation and coordination of national parks. It includes their strategic objectives on conservation, public use, research, monitoring, training and awareness raising, as well as objectives on cooperation and collaboration at both national and international level.</p> <p>The main mission of EByC is to 'organise, within the framework of and as implementation of the Spanish Strategy and the Spanish Science, Technology and Innovation Plan (EECTI and PECTI), a system that promotes the generation and transfer of knowledge on biodiversity and ecosystem services, coordinated and inclusive, of quality, inclusive and effective, that covers planning and management needs in order to achieve their protection, conservation, sustainable use, restoration and their economic and social value'.</p>	<p>The NECP does not present any measures or actions in the National Parks. Therefore, no interaction with its Master Plan is foreseen.</p> <p>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.</p> <p>Some measures in this regard include:</p> <ul style="list-style-type: none"> <li>- Measure 1.29. Knowledge generation, dissemination and awareness raising</li> </ul>
<b>Biodiversity and Science Strategy (EByC)</b>	<p>The phenological monitoring programme (promoted by the Spanish Biosphere Reserves Network and the Autonomous National Parks Body) is a citizen science project that contributes to raising awareness and raising awareness of</p>	

5. Marine environment

Marine strategy for the North Atlantic demarcation

It is the main planning instrument established under Directive 2008/56/EC of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) and transposed into the Spanish regulatory 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 **North Atlantic Marine District**.

Currently, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus beginning the second cycle of marine strategies.

The strategy constitutes the general framework to which the various sectoral policies and administrative actions with an impact on the marine environment will have to comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of water, the determination of good environmental status, the setting of environmental objectives, a monitoring programme and a programme of measures to achieve those objectives. It includes the marine environment between Spain and France in the Bay of Biscay and the northern boundary of the jurisdictional waters between Spain and Portugal.

The measures provided for in the NECP that are developed in the marine environment of the North Atlantic RBD shall be subject to the report on compatibility with marine strategies in order to avoid potential negative environmental impacts.

Particular attention needs to be paid to the development of the following measures:

- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection
- Measure 1.3. Development of new renewable electricity generation facilities, as regards 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 from shipping
- 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 Atlantic RBD

It is the main planning instrument (established under Directive 2008/56/EC of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) and transposed into the Spanish regulatory 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 **South Atlantic Marine District**.

Currently, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus beginning the second cycle of marine strategies.

The strategy constitutes the general framework to which the various sectoral policies and administrative actions with an impact on the marine environment will have to comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of water, the determination of good environmental status, the setting of environmental objectives, a monitoring programme and a programme of measures to achieve those objectives. It comprises the marine environment between the jurisdictional waters between Spain and Portugal in the Gulf of Cádiz and the meridian passing through the Espartel Cape.

The measures provided for in the NECP that are developed in the marine environment of the South Atlantic RBD shall be subject to the report on compatibility with marine strategies in order to avoid potential negative environmental impacts.

Particular attention needs to be paid to the development of the following measures:

- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection
- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection
- Measure 1.3. Development of new renewable electricity generation facilities, as regards 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 from shipping
- Measure 1.22. Individual projects and strategy for sustainable energy on islands

Planning instrument	Objectives and/or prescriptions of the instrument with planning with which it can interacting the NECP	Significant Interactions of the NECP the objectives of the instrument of planning
---------------------	--	---

Planning instrument	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant interactions of the NECP with the objectives of the instrument of planning
Marine Strategy for the Estrecho and Alboran RBD	<p>It is the main planning instrument (established under Directive 2008/56/EC of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) and transposed into the Spanish regulatory 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 <b>Estrecho and Alboran Marine District</b>.</p> <p>Currently, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus beginning the second cycle of marine strategies.</p> <p>The strategy constitutes the general framework to which the various sectoral policies and administrative actions with an impact on the marine environment will have to comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of water, the determination of good environmental status, the setting of environmental objectives to be achieved, a monitoring programme and a programme of measures to achieve those objectives. It comprises the marine environment between the meridian passing through the Cape of Espartel and an imaginary line set at 128° from the meridian passing through the Cape of Gata, as well as the marine environment over which Spain exercises sovereignty or jurisdiction in Ceuta, Melilla, the Chafarinas Islands, the Perejil islet, Vélez de la Gomera, Alhucemas and Alboran Island.</p>	<p>The measures provided for in the NECP that are developed in the marine environment of the Estrecho and Alboran RBD shall be subject to the report on compatibility with marine strategies to avoid possible negative environmental impacts.</p> <p>Particular attention needs to be paid to the development of the following measures:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.3. Development of new renewable electricity generation facilities, as regards demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms</li> <li>- Measure 1.7. Adaptation of electricity grids for the integration of renewables</li> <li>- Measure 1.13. Decarbonisation from shipping</li> <li>- Measure 1.22. Individual projects and strategy for sustainable energy on islands</li> </ul>

Planning instrument	Objectives and/or prescriptions of the instrument planning with which it can interacting the NECP	Significant Interactions of the NECP with the objectives of the instrument of planning
<p><b>Marine Strategy for the Lower Non-Balearic Demarcation</b></p>	<p>It is the main planning instrument (established under Directive 2008/56/EC of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) and transposed into the Spanish regulatory 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 <b>Balearic Marine District</b>.</p> <p>Currently, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus beginning the second cycle of marine strategies.</p> <p>The strategy constitutes the general framework to which the various sectoral policies and administrative actions with an impact on the marine environment will have to comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of water, the determination of good environmental status, the setting of environmental objectives to be achieved, a monitoring programme and a programme of measures to achieve those objectives. It comprises the marine environment between an imaginary line set at 128° from the meridian passing through the Cape Gata, and the boundary of the jurisdictional waters between Spain and France in the Gulf of Leon.</p>	<p>The measures provided for in the NECP that are developed in the marine environment of the NON-Balearic RBD shall be subject to the report on compatibility with marine strategies in order to avoid possible negative environmental impacts.</p> <p>Particular attention needs to be paid to the development of the following measures:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.3. Development of new renewable electricity generation facilities, as regards demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms</li> <li>- Measure 1.7. Adaptation of electricity grids for the integration of renewables</li> <li>- Measure 1.13. Decarbonisation from shipping</li> <li>- Measure 1.22. Individual projects and strategy for sustainable energy on islands</li> </ul>
<p><b>Marine Strategy for the Canary Islands RBD</b></p>	<p>It is the main planning instrument (established under Directive 2008/56/EC of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive) and transposed into the Spanish regulatory 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 <b>Canary Islands Marine District</b>.</p> <p>Currently, with the approval of Royal Decree 1365/2018 of 2 November approving marine strategies, the first cycle of marine strategies has been closed, thus beginning the second cycle of marine strategies.</p> <p>The strategy constitutes the general framework to which the various sectoral policies and administrative actions with an impact on the marine environment will have to comply in accordance with the relevant sectoral legislation. It includes the assessment of the environmental status of water, the determination of good environmental status, the setting of environmental objectives to be achieved, a monitoring programme and a programme of measures to achieve those objectives. It includes the marine environment around the Canary Islands over which Spain exercises sovereignty or jurisdiction.</p>	<p>The measures provided for in the NECP that are developed in the marine environment of the Canary Islands RBD shall be subject to the report on compatibility with marine strategies in order to avoid possible negative environmental impacts.</p> <p>Particular attention needs to be paid to the development of the following measures:</p> <ul style="list-style-type: none"> <li>Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>Measure 1.3. Development of new renewable electricity generation facilities, as regards demonstration projects for developing technologies (offshore wind and offshore energy) and future offshore wind farms</li> <li>Measure 1.7. Adaptation of electricity grids for the integration of renewables</li> <li>Measure 1.13. Decarbonisation of the maritime transport</li> <li>Measure 1.22. Unique projects and strategy for sustainable energy on islands</li> </ul>



Planning instrument	Objectives and/or prescriptions of the instrument planning with which it can interacting the NECP	Significant Interactions of the NECP with the objectives of the instrument of planning
<b>Strategic Plan for Spanish Aquaculture 2014-2020</b>	Implementing the Strategy for the Sustainable Development of Spanish Aquaculture. It is the framework for action for Spanish aquaculture and aims to propose lines of action that will enable the growth and sustainable development of Spanish aquaculture, from its social, environmental and economic perspective.	<p>The Spanish Strategic Plan for Aquaculture determines the suitability of the different coastal marine areas for the development of aquaculture activity and restricts activities that may interfere with fish farming, so the development of the measures in the PNIEC must be in line with the zoning provided for in that plan.</p> <p>Measure 1.1 Development of renewable energy compatible with biodiversity and ecosystem protection</p>
<b>Spain's contribution to the Guidelines Strategic for a more sustainable and competitive EU Aquaculture 2021-2030 (EsAcui)</b>	It is a key strategic instrument for addressing the challenges of Spanish aquaculture in the period 2021-2030, identifying common problems in detail, analysing different ways of addressing them and optimising the efforts to be made.	<p><u>It has a bearing on this aspect.</u></p> <p>The 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 definitively boost aquaculture in Spain and restricts activities that may interfere with fish farming, so that the development of the measures in the NECP must be in line with the zoning provided for in that plan.</p> <p>Measure 1.1 Development of renewable energy compatible with biodiversity and ecosystem protection</p>
<b>StatePlan for the Protection of the Coastal Sea Against Pollution (Ribera Plan)</b>	<p>The Plan shall apply to cases of accidental or deliberate marine pollution, whatever its origin or nature, which affects or is likely to affect the coast. It includes sensitivity atlas on the Spanish coast and a vulnerability and risk analysis of the coast, as well as the logistical and management capacities needed to cope with an episode of pollution of significant size and intensity.</p> <p>The fight against marine pollution on the coast focuses on three aspects: prevention, organisation of response, and coordination of resources and staff between administrations.</p>	<p><u>Has an impact on this aspect</u></p> <p>The NECP provides for measure 1.13. Decarbonisation of maritime transport, in line with this Plan, which consists of decarbonising the maritime sector with the lowest carbon, social and economic leakage impact.</p>
<b>Strategy for Adaptation to climate change in the Spanish coast 2016</b>	<p>It has two general objectives: Increase the resilience of the Spanish coast to climate change and climate variability and integrate climate change adaptation into Spanish coastal planning and management.</p> <p>In general, the Strategy aims to improve the environment of the coast and coastline in the face of the effects of climate change, and sets out a number of sustainability principles.</p> <p>The strategy proposes a system of indicators and indices that provide objective information for the establishment of policies and strategies for action to correct and prevent the effects of climate change on the Spanish coast.</p>	<p>The gas emission reduction measures included in the NECP contribute to curbing the effects of climate change (rising sea levels, acidification, extreme weather events, etc.).</p> <p>On the other hand, the NECP is perfectly compatible with the sustainability principles set out in the Strategy, especially as regards the reduction of air pollution and greenhouse gas emissions.</p> <p>The measures provided for in the NECP will achieve a 31 % reduction in greenhouse gas (GHG) emissions by 2030 compared to 1990.</p>

Planning instrument	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant interactions of the NECP with the objectives of the instrument of planning
<p>Litoral HYPERLINK "https://www.boe.es/boe/dias/2010/12/30/pdfs/BOE-A-2010-20050.pdf?id=BOE-A-2010-20050"</p>	<p>The objective of the Strategic Environmental Study is to identify the areas of the public maritime domain that, for environmental purposes, meet favourable conditions for the installation of offshore wind farms (with a capacity of more than 50 MW, subject to the procedure for reserving the area in accordance with Royal Decree 1028/2007, which needs to be updated). To this end, it establishes, through a geographical representation, the following zoning:</p> <p>a) Eligible areas: the areas most suitable for the establishment of offshore wind farms because their environmental effects are, in principle, reduced compared to their advantages.</p> <p>b) Exclusion zones: areas to be excluded from the process because their potential significant environmental effects or conflict with other uses of the marine environment have been identified.</p> <p>c) Eligible areas with environmental constraints: the areas in which the effects or conflicts identified must be analysed in detail during the environmental assessment procedure for each specific project.</p> <p>Furthermore, the study provides environmental criteria for the design of offshore wind farm projects to be developed in the future.</p>	<p>The NECP provides for:</p> <p>Measure 1.1 Development of renewable energy compatible with biodiversity and ecosystem protection</p> <p>Measure 1.2. Development of renewable energy compatible with the territory and rural development</p> <p>measure 1.3. Development of new renewable electricity generation facilities, demonstration projects for developing technologies (specifically offshore wind and offshore energy) and the deployment of offshore wind farms.</p> <p>In Measure 1.4. Development of innovative technology facilities, the NECP recognises the need to create a road map for offshore wind and offshore energy in Spain, with the aim of reducing administrative barriers to the development of this renewable energy source.</p> <p>In Measure 1.7 on the adaptation of electricity grids for the integration of renewables, the NECP also provides for the necessary planning of offshore electricity infrastructure associated with the deployment of offshore wind and, to a lesser extent, offshore energy.</p> <p>The Spanish Litoral Environmental Strategic Study for the installation of marine wind farms is a reference to be considered for the location of offshore wind farms. In any event, this is an outdated study and zoning based on environmental and technical feasibility aspects, and in 2009 no provision was made for offshore wind energy on floating platforms.</p>
<p><b>Master Plan for the Network of Marine Protected Areas</b></p>	<p>This plan is developed with the dual purpose of facilitating the operation of RAMPE, established in 2010, and of building a network capable of adding value to the sites that form part of it in terms of conservation and restoration of natural heritage and biodiversity.</p> <p>To this end, and among other measures, potential ecological and connectivity corridors will be analysed, either by marine demarcation or at regional and global level. Pilot projects for the adaptation of fishing gear will also be developed and/or the interactions and impact of both fishing and non-fishing activities (recreational and tourism, anchor and navigation, port activities, aquaculture, renewable energy, dumping or extraction of sand and other minerals) will be assessed, among others.</p>	<p>This plan is in line with the NECP, as it aims to promote an ecologically representative and well-connected network that contributes to the favourable conservation of its species, habitats and ecosystems, and ensures the compatibility of the uses and activities carried out in these sites with the conservation objectives.</p> <p>Measure 1.1 Development of renewable energy compatible with biodiversity and ecosystem protection is abundant in this respect.</p> <p>Also measure 1.13 Decarbonisation of maritime transport</p>

## 6. Landscape and cultural heritage

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>European Convention Landscape</b></p>	<p>This Convention seeks to protect, manage and manage European landscapes, recognising them as a common resource. Among its objectives it is promoting their protection, management and organisation, as well as organising European cooperation in this field.</p>	<p>The NECP presents measures that may be in line with the objectives of the European Landscape Convention. This includes Measure 1.35. Forest sinks, including improvements in forest systems, dehesas and banks.</p> <p>However, there are other measures which may entail a change in the landscape of the landscape, in particular:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Renewable energy development compatible with the territory and rural</li> <li>- Measure 1.3. Development of new electricity-generating installations using renewable energy</li> <li>- Measure 1.11. Framework for the development of thermal renewables</li> <li>- Measure 1.21. Specific programmes for biomass harvesting</li> <li>- Measure 1.22. Unique projects and strategy for sustainable energy on islands</li> </ul> <p>The actions and measures provided for in the NECP must pay attention to the provisions of the Convention on the protection, management and planning of landscapes. Impacts on the landscape should be minimised and environmental integration measures developed.</p>

## - . Land use, social and economic development

Instrument for planning	Objectives and/or prescriptions of the instrument with planning with which you can	Significant Interactions of the NECP with the objectives of the instrument of
<p>HYPERLINK "https://www.mapa.gob.es/es/pac/post-2020/"<b>Common Agricultural Policy</b></p>	<p>Europe's agricultural policy aims to support farmers' incomes while seeking to obtain the high quality agricultural products required by the market. On the other hand, developing this activity with due regard for the environment, such as the introduction of renewable energies, more efficient practices or improvements in land use management.</p> <p>It is a result-oriented policy whose objectives are as follows:</p> <ul style="list-style-type: none"> <li>- To foster a smart, competitive, resilient and diversified agricultural sector ensuring long term food security</li> <li>- To support and strengthen environmental protection, including biodiversity, and climatic action and to contribute to achieving the environmental and climate-related objectives of the Union including its commitments under the Paris Agreement</li> <li>- To strengthen the socio-economic fabric of rural areas.</li> </ul> <p>In relation to climate change, the aim is to promote better use of natural resources to combat climate change and preserve biodiversity.</p>	<p>The agriculture sector is an electricity-intensive sector and energy costs are a key element in setting the prices of irrigated agricultural products. The NECP promotes self-consumption of energy as a measure of competitiveness, as it makes it possible to reduce and stabilise energy costs in the long term.</p> <p>It also aims to reduce energy consumption on farms and irrigation communities through the modernisation of existing facilities, as well as to increase the sink effect of farming systems. Some measures in this regard:</p> <ul style="list-style-type: none"> <li>- Measure 1.8. The development of self-consumption with renewables and distributed generation</li> <li>- Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors</li> <li>- Measure 1.36. Agricultural sinks</li> <li>- Measure 2.14. Energy efficiency on farms, irrigation communities and agricultural machinery.</li> </ul>
<p><b>Spain's CAP Strategic Plan post 2020 for Spain (EPPAC) Plan Strategic for Spain for CAP post 2020</b></p>	<p>Commitments made at international level through the Paris Agreement and the 2030 Agenda for Sustainable Development have this is reflected in the CAP. European agriculture joins the agenda of solutions to global challenges, particularly those linked to climate and the environment, but also those related to health, nutrition, animal welfare, the quality and sustainability of our system food.</p> <p>One of its objectives is the promotion of a smart, resilient and diversified agriculture that ensure food security; the enhancing environmental care and climate action, helping to achieve the climate and environmental objectives of the EU; and strengthening the partner fabric — economic in rural areas.</p>	<p>Agriculture, through the CAP, can play a very positive role in meeting the climate and environmental challenge, while ensuring food security. Through cross-compliance (set of legal rules) and of agricultural practices that farmers must comply with as a condition for receiving direct payments) practices such as efficient soil fertilisation, which is specifically included in the NECP, are encouraged.</p> <p>Some measures, which contribute to the reducing GHG emissions and the environmental integration of agriculture are:</p> <ul style="list-style-type: none"> <li>Measure 1.8. The development of self-with renewables and distributed generation</li> <li>Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors</li> <li>Measure 1.36. Agricultural sinks</li> <li>Measure 2.14. Energy efficiency in agricultural holdings, irrigation communities and agricultural machinery.</li> </ul>
<p><b>National Programme for Rural Development 2022</b></p>	<p>Its key objectives are to: promote the integration of agri-food associations, encourage the creation of clusters and organisations of producers and fostering industrial dynamism of the agri-food sector through the cooperation. Promoting and promoting the integration of associative entities agri-food tools of great importance in promoting competitiveness, rescaling, modernisation and internationalisation.</p>	<p>Various measures in the NECP are in line and strengthen the National Rural Development this is particularly important. measures related to self-consumption (1.8) and the development of energy communities renewables in rural areas (1.2) favouring their access to energy and security of supply.</p>

Instrument for planning	Objectives or prescriptions of the planning instrument with which it can interacting the NECP	Significant interactions of the NECP with the objectives of the instrument of planning
<p><b>Operational programme Multiregional Spain</b></p> <p>Spanish Sustainable HYPERLINK "<a href="https://www.boe.es/">https://www.boe.es/</a></p>	<p>It is an instrument that gives concrete expression to the overall strategies and objectives of intervention by the General State Administration and the Autonomous Communities co-financed by the ERDF in the areas of smart and sustainable growth in urban areas.</p> <p>The programme contributes to the improvement and recovery of the competitiveness of the Spanish economy through smart growth and smart services, which on the one hand contribute to the development of the areas and activities of SMEs, and on the other hand, to the efficient use of energy and other resources, and to the improvement of the environment and the quality of life of citizens.</p> <p>The NECP identifies challenges and opportunities across its five dimensions: decarbonisation of the economy, including renewable energy; energy efficiency, energy security; the internal energy market and research, innovation and competitiveness. It greatly reinforces the priority areas of the EHDS such as climate change, clean energy, transport and public health, primarily. It also attaches particular importance to fairness and the fight against energy poverty.</p> <p>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, thus reducing total energy demand and replacing fossil fuels with indigenous fuels (mainly renewable energy).</p>	<p>The NECP is in line with the objectives of the Multi-Regional Operational Programme towards a more resource-efficient, greener and more competitive sustainable economy (reduction of GHG emissions, improvement of energy efficiency, increase in the share of renewable energy sources), especially measures related to the decarbonisation of energy and energy efficiency dimensions.</p> <p>Finally, the measures of the NECP contribute positively to an improvement in air quality, through the reduction of air pollutants, with clear benefits for human health.</p>

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>Strategy for Sustainable Development 2030</b></p>	<p>The Sustainable Development Strategy striving for a more coherent society in the rational use of their resources are socially fairer and cohesive and territorially more balanced. Its main objective is to make the 2030 Agenda a reality.</p>	<p>The NIECC identifies challenges and opportunities across its five dimensions: decarbonisation of the economy, including renewable energy; energy efficiency, energy security; the internal energy market and research, innovation and competitiveness. It greatly reinforces the priority areas of the Sustainable Development Strategies such as climate change, clean energy, transport and public health, primarily. It also attaches particular importance to fairness and the fight against energy poverty.</p> <p>The measures provided for in the Plan will enable achieve a 31 % reduction in greenhouse gas (GHG) emissions by 2030 compared to 1990.</p> <p>The NECP boosts energy efficiency thereby reducing total energy demand and replacing fossil fuels with indigenous ones (energy renewables, essentially).</p> <p>Finally, the measures of the NECP contribute positively to an improvement in air quality, through the reduction of air pollutants, with clear benefits for human health.</p>
<p>Sustainable Rural HYPERLINK "https://www.ciaorganico.net/docu</p>	<p>This programme analyses and diagnoses the situation of the rural environment in Spain, defines a rural development strategy, defines the rural areas that have been identified and proposed for implementation by the Autonomous Communities, specifies the types of multi-sectoral actions that may be implemented, defines the content that the zoning plans must have, defines the framework for cooperation between public administrations that combine with the rural environment, defines the budget and financing system, and establishes an evaluation and monitoring system.</p>	<p>The measures to be taken under the PNIEC shall take into account the determinations and recommendations contained in the joint environmental report of the PDSR.</p> <p>Some of the measures in the NECP make a positive contribution to rural development:</p> <ul style="list-style-type: none"> <li>- Measure 1.8. The development of self-consumption with renewables and distributed generation</li> <li>- Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors</li> <li>- Measure 1.36. Agricultural sinks</li> <li>- Measure 2.14. Energy efficiency on farms, irrigation communities and agricultural</li> </ul>

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<b>Sectoral plan for Nature tourism and Biodiversity 2014-2020</b>	<p>The Plan deepens and consolidates the concept of sectoral integration as a way forward in its conservation and sustainable use. Aims, through one of its targets, to integrate biodiversity into sectoral policies. Its objectives are to:</p> <ul style="list-style-type: none"> <li>- Developing tourism products of sustainable nature</li> <li>- Promoting sustainable products that integrate into the Natura 2000 network</li> <li>- Improving the consideration of biodiversity in nature tourism activities</li> <li>- Improving knowledge and information on nature tourism</li> </ul>	<p>Spain undertakes to ensure responsibly the natural heritage, in particular the protection of its biological diversity, one of the highest and most valuable in Europe.</p> <p>The results of the NECP in terms of GHG emissions have a positive impact on nature and biodiversity, especially on ecosystems most vulnerable to climate change, such as mountain areas, coastline or aquatic systems.</p> <p>In relation to tourism, measures to promote self-consumption and the promotion of renewables (electrical and thermal use) in accommodation and installations, as well as efficiency measures (in buildings and transport) reinforce a more sustainable nature tourism model.</p> <p><b>On the otherhand</b>, the development of the measure of new renewable electricity generation facilities, which is a major occupation of land in rural areas, should minimise its impact on the countryside, biodiversity and the natural values of the rural environment. The NECP will promote additional measures for the conservation and promotion of indigenous biodiversity and aquatic ecosystems, linked to the Spanish Strategic Plan for the Conservation and Rational Use of Wetlands.</p> <p>TheNECP will promote additional measures for the conservation and promotion of indigenous biodiversity and ecosystems, linked to the Strategic Plan for Natural Heritage and Biodiversity.</p>

Planning instrument	Objectives and/or prescriptions of the instrument planning with which it can interacting the NECP	Significant Interactions of the NECP with the objectives of the instrument of planning
<p><b>Actionplan for the implementation of the 2030 Agenda. Towards a Spanish Sustainable Development Strategy</b></p>	<p>The 2030 Agenda for Sustainable Development was unanimously adopted by the 193 UN Member States in 2015. The Agenda includes 17 Sustainable Development Goals (SDGs), 169 targets, 232 indicators, focusing on people, planet, prosperity, peace and alliances, means of implementation and the monitoring and review mechanism at national, regional and global level.</p> <p>Each Member State should promote the implementation of the Agenda through the specific instruments it considers: national strategies, plans or policies.</p> <p>In line with the Sustainable Development Goals of the UN 2030 Agenda, the Action Plan is an action-oriented programmatic document, prior to the formulation of a long-term sustainable development strategy. It shares the 17 Sustainable Development Goals set out by the UN, which are global objectives to eradicate poverty, protect the planet and ensure prosperity for all.</p>	<p>The Plan highlights climate change as an additional challenge in meeting other Sustainable Development Goals (SDGs) such as those related to water, underwater or terrestrial ecosystems (6, 14, 15), as well as the cross-cutting nature of measures to combat it, allowing synergies with all objectives.</p> <p>In this regard, the NECP has analysed the extent to which the various measures set out therein contribute to the various SDGs (see ANNEX E).</p> <p>The measures of the five dimensions of the NECP are in line with and share some of the objectives of the Action Plan for the implementation of the 2030 Agenda, along the lines of the SDGs (Sustainable Development Goals).</p> <p>The NECP presents very positive synergies with the objectives of the plan. It is defined as the central objectives of the Plan:</p> <ul style="list-style-type: none"> <li>- SDG 13. Take urgent action to combat climate change and its impacts</li> <li>- SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all</li> </ul> <p>In addition, the following interactions with other objectives are highlighted:</p> <ul style="list-style-type: none"> <li>- SDG 17. Strengthen the means of implementation and revitalise the global partnership for sustainable development</li> <li>- SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation</li> <li>- SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable</li> <li>- SDG 12. Ensure sustainable consumption and production patterns</li> <li>- SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</li> <li>- SDG 10. Reduce inequality within and among countries</li> </ul>
<p>Spanish Circular HYPERLINK "https://www.miteco.g</p>	<p>The Spanish Circular Economy Strategy (EHEC) lays the foundations for promoting a new model of production and consumption in which the value of products, materials and resources is maintained in the economy for as long as possible, in which the generation of waste is minimised and those that cannot be avoided are exploited as widely as possible. The Strategy thus contributes to Spain's efforts to achieve a sustainable, decarbonised, resource-efficient and competitive economy.</p> <p>The EHEC identifies six priority sectors of activity in which to incorporate this challenge for a circular Spain: construction, agri-food, fisheries and forestry, industrial, consumer goods, tourism and textiles and clothing.</p>	<p>The signatories of the Pact for a Circular Economy, signed in order to involve Spain's main economic and social actors in the transition to this economic model, commit to a series of actions, which are aligned with the NECP. These include:</p> <ul style="list-style-type: none"> <li>- Making progress in reducing the use of non-renewable natural resources</li> <li>- Promoting patterns that increase innovation and the overall efficiency of production processes</li> </ul> <p>These two actions are perfectly aligned with the dimensions of decarbonisation of the economy and energy efficiency addressed in the NECP.</p> <p>Key measures would be:</p> <ul style="list-style-type: none"> <li>- Measure 1.15. Development of biogas and biomethane</li> <li>- Measure 1.33. Reduction of emissions</li> </ul>

GHG in waste management



Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>Organic Production Strategy 2018-2020</b>  <b>Strategy for Organic Production 2018-2020</b></p>	<p>Instrument to promote the agri-food production of quality environmentally friendly products. It has the following objectives:</p> <ul style="list-style-type: none"> <li>- Promote domestic consumption and improve the marketing of organic products.</li> <li>- Contribute to a better sectoral structure of organic production.</li> <li>- Support the growth and consolidation of organic production, with a particular focus on organic livestock farming and the industrial sector</li> <li>- Explore the role of organic production in environmental policy and adaptation to climate change.</li> </ul>	<p>This strategy has positive synergies with the NECP in that it treats organic production with the objective of environmental improvement and adaptation to climate change.</p>
<p><b>Natural Papers Programme (Since 1993)</b></p>	<p>The Natural Pathways Programme aims to promote, enhance and know the natural paths and green roads (those carried out on old railway platforms) among the population. It seeks to contribute to the socio-economic development of rural areas, either by re-using disused traditional paths or by opening new paths. It will also encourage people to approach nature and rural areas, also responding to the social demand for alternative tourism services.</p>	<p>No interactions with the Natural Pathways Programme are foreseen in the development of the NECP.</p>
<p><b>National Plan for Irrigation</b></p>	<p>It aims to develop rural areas, integrating productive activity with the conservation of natural resources and respect for the environment, in accordance with the guidelines for structuring the territory, avoiding the loss of rural population. These include improving farmers' living standards, managing agricultural production and markets, improving irrigation water distribution and application infrastructure and incorporating environmental criteria into land and water management to prevent its degradation.</p>	<p>The agriculture sector is an electricity-intensive sector and energy costs are a key element in setting the prices of irrigated agricultural products. The NECP promotes self-consumption of energy as a measure of competitiveness, as it makes it possible to reduce and stabilise energy costs in the long term. It also aims to reduce energy consumption on farms and irrigation communities through the modernisation of existing facilities. Some measures in this regard:</p> <ul style="list-style-type: none"> <li>- Measure 1.8. The development of self-consumption with renewables and distributed generation</li> <li>- Measure 2.14. Energy efficiency on farms, irrigation communities and agricultural machinery.</li> </ul>
<p><b>Digital Digitalisation Strategy Agri-food and forestry sector and the rural environment</b></p>	<p>The Digitalisation Strategy for the agri-food and forestry sector and the rural environment defines the strategic lines and measures needed to boost the digital transformation of the agri-food and forestry sectors and rural areas, as well as the instruments envisaged for their implementation. Its general objective is to remove or reduce the current technical, legislative, economic and training barriers, thus contributing to the leadership of an economically, socially and environmentally sustainable agri-food sector and to the active population of rural areas, making it a more attractive, lively, dynamic and diversified place that creates wealth and quality employment, with a particular focus on young people and women.</p>	<p>No interaction with the Strategy for the Digitalisation of the Agri-Food, Forestry and Rural Environment is foreseen in the development of the NECP.</p>

## 8. Energy and industry

Instrument for planning	Objectives or requirements of the planning instrument with which can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
National Renewable Energy Action Plan in Spain (NREAP) 2011-2020.	<p>The National Renewable Energy Action Plan (NREAP) responds to the requirements and methodology of the Renewable Energy Directive and is in line with the model of National Renewable Energy Action Plans adopted by the European Commission.</p> <p>It was also in line with the binding targets set by the current Directive for 2011: ensure that renewable sources account for at least 20 % of final energy consumption in the year 2020 and a minimum share of 10 % of energy from renewable sources in energy consumption in the transport sector by that year.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the NREAP.</p> <p>One of the main results of the NECP is the approach to increasing renewable energy on the final use of energy in the economy as a whole, focusing mainly on the decarbonisation dimension of the current NECP.</p> <p>One of the main objectives of the NECP is to increase energy efficiency, reducing total energy demand and encouraging the replacement of fossil fuels by indigenous ones. (energy renewables, essentially).</p>
National Energy Efficiency Action Plan (NEEAP) 2017-2020	<p>The objective of the NEEAP 2017-2020 is to meet the requirement of Article 24 (2) of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency.</p> <p>The NEEAP sets the estimated energy consumption, energy efficiency measures planned the improvements the country expects and</p> <p>The energy presents efficiency measures in NEEAPs buildings, in industry, in transport, in agriculture and fisheries. also high-efficiency cogeneration and district heating and cooling in transformation.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the NEEAP.</p> <p>The measures provided for in the NECP in the energy efficiency dimension will make it possible to achieve a 41.6 % improvement in energy efficiency in 2030.</p>

the Instrument of	Objectives and/or prescriptions of planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
<p>Energy Plan <b>Renewables (RER)</b> 2011-2020.</p>	<p>The RER includes the design of new energy scenarios and the incorporation of targets in line with Directive 2009/28/EC on the promotion of the use of energy from renewable sources, which sets targets.</p> <p>The ultimate objective of the RER is to make the renewable sources account for at least 20 % of final energy consumption in the year 2020 and a minimum share of 10 % of energy from renewable sources in energy consumption in the transport sector by that year.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are consistent with the RER, and even more demanding.</p> <p>As a result of the NECP, the presence of renewables in the final use of energy in the economy as a whole is 48 % in 2030.</p> <p>The NECP presents, in the decarbonisation dimension, specific measures for the promotion of renewable energy. To be noted:</p> <ul style="list-style-type: none"> <li>- Measure 1.1. Development of renewable energy compatible with biodiversity and ecosystem protection</li> <li>- Measure 1.2. Development of renewable energy compatible with the territory and rural development</li> <li>- Measure 1.3. Development of new electricity-generating installations using renewable energy</li> <li>- Measure 1.8. The development of self-consumption with renewables and distributed generation</li> <li>- Measure 1.10. Decarbonisation of the industrial sector.</li> <li>- Measure 1.11. Framework for the development of thermal renewables</li> <li>- Measure 1.17. Plan to repower and restructure existing renewable electricity generation projects.</li> <li>- Measure 1.20. Promotion of bilateral procurement and promotion of forward markets for renewable electricity</li> </ul> <p>—</p> <p>The NECP presents energy efficiency measures in the transport sector (measures 2.1, 2.2, 2.3,2.4 and 2.5) that will contribute to the cumulative final energy savings target for the period 2021-2030.</p> <p>As a result of the measures adopted in the NECP, 30 % of renewables in transport are electrified and biofuels, above the 29 % required by the European Union for 2030.</p>

the Instrument of	Objectives and/or prescriptions of planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
Electricity transmission network development plan 2015-2020 (extended from 2020 at present)	<p>Planning is primarily aimed at ensuring security of electricity supply, while introducing environmental and economic efficiency criteria. The document sets out the infrastructure needed to ensure security of supply by the 20152020 planning horizon. The factors taken into account were:</p> <p>Fulfilment of electricity grid security and reliability requirements and, consequently, security of supply criteria.</p> <p>Minimisation of the overall environmental impact. A strategic environmental assessment was conducted on the electricity transmission network planning.</p> <p>Increase of international connection capacity as a means of improving Spain's integration into the single energy market, thus helping to reduce electricity prices.</p> <p>The integration of renewable energies into the grid, in order to promote the achievement of renewable energy targets.</p> <p>Meeting of demand arising from new industrial activity.</p> <p>Network planning in response to an analysis of possible alternatives and costs, making it possible to prioritise investments in order of urgency, adding the consideration of financial aspects to the other criteria.</p>	<p>The NECP is fully aligned with the Plan's factors, as it helps to improve supply, increase international connection capacity and boost the development of renewable energies.</p> <p>Measures in this respect would be:</p> <ul style="list-style-type: none"> <li>- Measure 4.4. Increasing electricity interconnection in the internal market</li> <li>- Measure 4.5. Electricity Transmission Network Development Plan 20212026</li> </ul>
Proposals for the development of the electricity transmission network under	<p>The proposals aim to make progress in the transition of the Spanish energy system in order to meet the targets for 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 2030 framework set in the European Union for energy and climate change.</p> <p>The integration of renewable generation in the electricity sector, both on the mainland and in non-mainland territories, makes it necessary to strengthen and grow transmission and distribution lines on Spanish territory, including peninsular connections, non-peninsular systems and interconnections between island systems. The NECP deals with all these aspects, as well as the development of management and storage mechanisms for non-manageable electric renewables to prevent discharges.</p> <p>The NECP provides for Measure 4.4 Increased electricity interconnection in the Internal Market and Measure 4.5. Electricity Transmission Network Development Plan 2021-2026</p>	<p>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.</p>

Instrument of	Objectives and/or prescriptions of the planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
General Guidelines for the New Spanish Industrial Policy 2030	<p>The General Guidelines for the New Industrial Policy 2030 form part of the Government's Agenda for Change and are aligned with the Sustainable Development Goals.</p> <p>The ultimate goal is to achieve a sustainable and inclusive growth model that promotes stable and quality employment; an active industrial policy aimed at transforming our production model with three objectives:</p> <ul style="list-style-type: none"> <li>- The reindustrialisation of the economy, i.e. the development and enhancement of the various industrial sectors in order to increase their share of GDP and employment.</li> <li>- The necessary transformation of the industrial fabric, especially small and medium-sized enterprises, in order to adapt it to a new context, marked by the rapid evolution of digital technologies and increasing international competition.</li> </ul> <p>Adaptation to the green transition in two strands: on the one hand, exploiting the opportunities arising from it, with a particular focus on moving towards a more circular and decarbonised economic model; and, on the other hand, the anticipation and mitigation of impacts it may cause, thereby ensuring an orderly and fair transition.</p>	<p>MtCO<sub>2</sub>eq.</p> <p>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, so its implementation will create significant investment and employment opportunities for the regions and districts of our country. Industrial, economic and employment opportunities identified and promoted in the districts and regions most affected by the energy transition and the decarbonisation of the economy are particularly relevant.</p> <p>Measures in this respect would be:</p> <ul style="list-style-type: none"> <li>- Measure 1.10. Decarbonisation of the industrial sector</li> <li>- Measure 2.6. Improvements in technology and process management systems in non-energy intensive industries</li> <li>- Measure 2.7. Improvements in technology and process management systems in energy intensive industries</li> </ul>
Strategic Framework for SME Policy 2030	<p>The Strategic Framework aims to improve the competitive capacity of small and medium-sized enterprises to meet the challenges of a global and digitalised economy and to help create a climate fit for their growth.</p> <p>Proposals are organised through seven levers: Entrepreneurship, Business Management and Talent, Regulatory Framework, Financing, Innovation and Digitalisation, Sustainability, and Internationalisation. These areas are accompanied by 50 action lines characterised by their horizontal nature, with an impact on the development of all SMEs as a whole.</p> <p>The actions that will be eligible for funding must be aimed at improving technology in industrial equipment and processes, or implementing energy management systems.</p> <p>The purpose of the aid programme is to encourage and 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 objectives of reducing energy consumption.</p> <p>The NECP is a planning tool that responds to EU demand to the challenge of climate change. It identifies challenges and opportunities across its five dimensions.</p> <p>One of the main targets presented in the NECP is the reduction of total gross GHG emissions in the industry sector (combustion), which reaches 17,5</p>	<p>Achieving the objectives of the NECP in terms of energy efficiency and energy generation from renewable sources has a positive impact on the competitiveness of the Spanish economy due to:</p> <ul style="list-style-type: none"> <li>- improving competitiveness in industry in particular, and in the business fabric in general, through a reduction in energy bills;</li> <li>- ensures in the long term competitive energy costs that are less exposed to the risks of price variability;</li> <li>- the Plan presents an opportunity for the development of a high added-value equipment and services industry.</li> </ul> <p>Measures 2.6 and 2.7. Improvements in industrial process management and technology are intended to facilitate the penetration of final energy saving technologies, mainly in small and medium-sized enterprises (SMEs).</p> <p>Measures 5.1. Strategic Action in 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 sharing between political actors and stakeholders, favouring in particular the participation of SMEs.</p>

the Instrument of	Objectives and/or prescriptions of planning tool with which to plan can interact with the NECP	Significant interactions of the NECP with the objectives of the planning instrument
Spanish Strategy for the Development of the Energy Use of Forest Biomass	<p>The strategy aims to promote, for energy purposes, residual forest biomass, as it considers that the introduction of a sustainable energy model, based on saving, efficiency and diversification of sources, requires a strong boost to the development of residual forest biomass as renewable energy.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the Spanish Strategy for the Development of the Energy Use of Forest Biomass.</p> <p>The NECP presents some measures to promote the use of biomass as an energy source, which contributes to the development of its objectives. The following measures are highlighted:</p> <p>Measure 1.10. Decarbonisation of the industrial sector. Measure 1.11. Framework for the development of thermal renewables Measure 1.21. Specific programmes for biomass harvesting Measure 1.33. Reduction of GHG emissions in waste management</p>
Strategy for	<p>Spain has a characteristic energy profile: it is dependent on external resources and has a limited level of energy interconnection, but at the same time has a complete and diversified energy mix.</p> <p>The Energy Security Strategy takes a forward-looking approach to the sector, assessing factors such as technological advances to generate and distribute energy, energy interdependence and the influence of power shifts on the availability of resources. In addition, the influence of the regulatory framework of the energy market on competition, competitiveness and innovation of businesses.</p>	<p>The NECP promotes an intense reduction in energy dependency, especially as regards the import of fossil fuels, through the implementation of energy efficiency measures and the development of indigenous renewable energy sources.</p> <p>In addition, the NECP has developed a dimension, with a package of measures, specifically targeting energy security.</p>
Strategy for Energy Security is guided by the final objective of diversification of energy sources, ensuring security of transport and supply and boosting energy sustainability.	<p>As a fundamental part of the National Security System, Objective 2 of the National Energy Security Strategy states that it is necessary to 'consider all energy sources in order to maintain a balanced mix that correctly reflects all the specific features of Spain and that makes it possible to achieve a certain guarantee of supply, at competitive prices, and within a sustainable model in which clean energy gradually becomes more important'.</p>	<ul style="list-style-type: none"> <li>- Measure 3.1. Plan + Energy Security</li> <li>- Measure 3.2. Maintenance of minimum safety stocks of oil and gas products.</li> <li>- Measure 3.3. Reduced energy dependency on islands.</li> <li>- Measure 3.4. Recharging points for alternative fuels.</li> <li>- Measure 3.5. Boosting regional cooperation.</li> <li>- Measure 3.6. Deepening contingency plans.</li> <li>- Measure 3.7. Planning for the safe operation of a decarbonised energy system</li> <li>- Measure 3.8. Strategic raw materials for the energy transition</li> <li>- Measure 3.9. Cybersecurity in the Energy Sector</li> </ul>

## 9. Transport, mobility and housing

### Long-term strategy for energy renovation in the building sector in Spain (ERESEE 2014, updated 2017 and 2020)

The 2014 ERESEE strategy provided the starting point for boosting energy renovation in the building sector in Spain, as well as a roadmap that is still in force and is a guide for the various actors involved in renovation processes.

The update carried out in 2017, which meets the requirements of Article 4 of Directive 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; monitoring of measures to boost energy renovation put in place; 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.

In addition, in order to comply with Article 2a of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, as amended by Directive (EU) 2018/844, the ERESEE is updated in 2020. This latest update has been assessed by BPIE Buildings Performance Institute Europe as the best of the national strategies submitted to the EU in compliance with the mandate of Directive 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 PNIEC measures relating to the energy renovation of buildings are:

- Measure 2.8. Energy efficiency in existing buildings in the residential sector.
- Measure 2.13. Energy efficiency in cold generating equipment and large air conditioning installations in the tertiary sector and public infrastructure.

### Plan for Infrastructure, Transport and Housing (PITVI) 2012-

The PITVI puts forward a new strategic planning framework for transport and housing infrastructure in Spain, which marks the 'roadmap' of the new policy in these sectors.

The Plan enhances the maintenance of existing infrastructure and ensures mobility through the provision of public service obligations (to be set by the State in the field of transport), and also seeks to involve the private sector in investments.

One of the objectives of the PITVI is to improve and expand, in relation to passenger transport, the contribution of local networks in the country's major urban centres. With regard to freight transport, the power of rail transport is to improve the efficiency and competitiveness of rail transport.

The PITVI also promotes new technological developments in the field of transport system management innovation. This is compatible with the development of alternative fuels to diesel traction that are more environmentally efficient and contribute to the reduction of greenhouse gases (GHG).

In the area of housing, the PITVI enhances rent and renovation.

Actions to improve energy efficiency in transport and sustainable mobility in cities in the NECP have been aimed at encouraging a modal shift in the mobility of people towards those modes least energy-consuming, which contributes to improving the efficiency and competitiveness of the sector.

The NECP will also promote the improvement of the energy efficiency of the conventional rail system, making it more efficient and competitive and enabling it to be geared towards meeting, to a greater extent, the needs of everyday metropolitan mobility and freight. In parallel, it will promote energy efficiency measures in air and maritime transport, as indicated in Measure 2.2 on the most efficient use of means of transport.

As regards housing, the NECP provides for energy efficiency measures in the residential sector, the promotion of alternative energy and self-consumption, which have synergies with the PITVI, especially in relation to the quality and sustainability of buildings and urban planning.

The PITVI and the NECP are aligned.

Planning instrument	Objectives and/or prescriptions of the instrument with which it can interact with the NECP	Significant Interactions of the NECP with the objectives of the instrument of planning
---------------------	--	--

Instrument for planning	Objectives or prescriptions of the planning instrument with which it can interacting the NECP	Significant interactions of the NECP with the objectives of the instrument of planning
<p><b>Spanish Strategy for Eems' objectives and guidelines materialises sustainable mobility in 48 measures structured in five areas: (EEMS)territory, transport planning and its</b></p>	<p>National reference framework integrating coordination principles and tools to guide and give coherence to sectoral policies that facilitate sustainable and low-carbon mobility. Sustainable mobility means ensuring that transport systems respond to economic, social and environmental needs, minimising their negative impacts.</p> <p>infrastructure; climate change and reducing energy dependency; air quality and noise; safety and health; and demand-side management. Among the measures envisaged, particular attention is paid to promoting alternative mobility to private vehicles and the use of the most sustainable modes, noting the need to take care of the implications of urban planning for the generation of mobility.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the Eems.</p> <p>The decarbonisation dimension of the energy system includes measures to achieve emission reductions. The mobility and transport sector is the second largest sector to reduce its emissions in-2021.</p> <p>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 less energy-consuming modes, as well as other measures in this area:</p> <ul style="list-style-type: none"> <li>- Measure 2.2. Modal shift in freight transport with a greater presence of rail.</li> <li>- Measure 2.5. Electric vehicle impulse.</li> <li>- Measure 2.11. Energy efficiency in buildings in the tertiary sector.</li> </ul> <p>In addition, the NECP included actions aimed at improving the efficiency of the vehicle fleet through fleet renewal and the incorporation of technological advances, as well as actions aimed at the efficient use of means of transport.</p>
<p><b>State plan for Housing 2018-2021</b></p>	<p>One of the objectives of the State Housing Plan is to:</p> <p>Continue to adapt the support system to current social needs and limited resources. To help mortgage debtors meet the obligations of their mortgage loans. Strengthen inter-administrative cooperation and coordination, Improving building quality (conservation, energy efficiency, universal accessibility and environmental sustainability) Contribute to the increase in the number of dwellings rented or transferred in use. Facilitate young people's access to decent and adequate rental housing. Help prevent the depopulation of small municipalities. Facilitate the enjoyment of decent and adequate housing for the elderly and people with disabilities.</p>	<p>The NECP sets out actions on the energy renovation of buildings: improving energy efficiency (thermal envelope) and improving energy efficiency (renovation of thermal heating installations and DHW). There are also measures to combat energy poverty.</p> <ul style="list-style-type: none"> <li>- Measure 1.8. Development of self-consumption with renewables and distributed generation.</li> <li>- Measure 2.9. Renovation of residential equipment.</li> <li>- Measure 4.2. Fighting energy poverty.</li> </ul>
	<p>This Plan is currently in force as it was extended until 2023, in accordance with Royal Decree 42/2022 of 18 January.</p>	



Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>Impulse strategy of the vehicle with Alternative energy sources</b></p>	<p>It analyses the particularities of each of the alternative technologies to conventional fuels (petrol and diesel) and proposes concrete actions structured in 30 measures covering three policy areas:</p> <p><b>Industrialisation:</b> The industrialisation of alternative energy vehicles and of associated points of supply</p> <ul style="list-style-type: none"> <li>- Market: Demand-boosting actions are defined to achieve a sufficient market.</li> <li>- Infrastructure: Support an infrastructure network to meet users' mobility needs and thus enable the development of an alternative fuel market</li> </ul>	<p>The NECP contains specific measures relating to the transport sector, which include a 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.</p> <p>These measures are detailed in the energy efficiency dimension and there is a specific measure in relation to the strategy:</p> <p><b>Measure 2.5. Promotion of electric vehicles</b></p> <p>On the other hand, the decarbonisation dimension incorporates a measure to support advanced biofuels:</p> <ul style="list-style-type: none"> <li>— Measure 1.12. Advanced renewable biofuels in transport.</li> </ul>
<p><b>Framework for action National Energy Alternatives in the</b></p>	<p>Approved by the Council of Ministers in 2016, this Framework for Action aims to promote the use of alternative energies in transport with a view to technological neutrality.</p>	<p>The NECP contains specific measures relating to the transport sector, which include a 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.</p> <p>These measures are detailed in the energy efficiency dimension and there is a specific measure in relation to the strategy:</p> <p><b>Measure 2.5. Promotion of electric vehicles</b></p> <p>On the other hand, the decarbonisation dimension incorporates a measure to support advanced biofuels:</p> <ul style="list-style-type: none"> <li>— Measure 1.12. Advanced renewable biofuels in transport.</li> </ul>
<p><b>Climate Change Master Plan (2018-2030) ADIF</b></p>	<p>The Plan, developed by RENFE and ADIF, focuses on reducing emissions and saving energy by promoting modal shift to rail, boosting the decarbonisation and energy efficiency of the rail system, and increasing the use of renewable energy, including measures such as the purchase of green energy.</p> <p>The Plan aims to enhance and exploit the environmental benefits of rail over other modes of transport in terms of air emissions.</p>	<p>The Plan is limited to the General Interest Rail Network (RFIG), which consumes 98 % of the energy of the railway sector in Spain. The Plan shows, in line with the NECP, that the least energy-consuming mode of transport is rail. The external costs of rail are much lower than those of other modes, such as road and air transport (with externalities between 3 and 5 times those of the former). For CO<sub>2</sub> emissions, road emissions are 5 to 7 times those of rail and air transport 7 to 10 times.</p> <p>The objectives of ADIF's Climate Change Master Plan are modal shift, energy efficiency and decarbonisation, all of which are included in the NECP, which is why they can be said to be aligned.</p>

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
Air Navigation Plan 2017-2020 (updated in 2021)	<p>The European Commission's <i>Single European Sky (Single European Sky)</i> project makes airspace an increasingly global and competitive environment. Its key objective is to eliminate the current fragmentation of airspace and national systems in order to achieve a homogeneous European space, with interoperable technological systems.</p> <p>In this regard, ENAIRE (national public entity providing air traffic services) and its strategic plan called 'Flight Plan 2020' is intended to modernise and evolve the Spanish air navigation system. Improving airspace capacity and efficiency is one of the priorities of this plan.</p> <p>In 2021, the strategic plan was updated as "plan de cielo 2025", which will continue the process of modernising and transforming ENAIRE, to be an essential tool for managing the crisis resulting from the COVID-19 pandemic and addressing the deep structural changes in the sector.</p>	<p>The NECP interacts positively with the environmental commitments of the Navigation Plan to strengthen the reduction of emissions in relation to transport efficiency.</p> <p>The Navigation Plan incorporates as environmental benefits the improvement of route efficiency (design of more direct routes) and the implementation of green approaches to airports, with the aim of reducing GHG emissions at least 185.000 tonnes of CO<sub>2</sub> to 2025, reducing flight distances (route improvement) and saving fuel.</p> <p>Aspects that are aligned with the NECP, in the area of energy efficiency in transport.</p>
National Strategy for Cybersecurity	<p>This strategy has boosted and strengthened public-private cooperation with the various energy operators, a task that has been coordinated by the Cyber Coordination Office (OCC) of the National Centre for Critical Infrastructure and Cybersecurity Protection (CNPIC). The revisions of 13 Operator Safety Plans (OSP) have also been approved, checking that they are in line with the current situation of the threats and challenges to critical infrastructures in the energy sector and in the nuclear industry, updating the information contained in those plans.</p>	<p>The achievement of the objectives of the Plan is conditional on the proper functioning of the cybersecurity mechanisms. In particular the dimensions of the Energy Security and Decarbonisation Plan.</p> <p>The NECP interacts positively with the commitments of cybersecurity promoting cybersecurity measures for both energy networks (in particular electricity grids) and data transfer measures, in particular of consumers, as indicated in measure 3.9 in the size of the internal energy market.</p>

## 10. Waste

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>State Programme of Prevention of Wastes 2014-2020</b></p>	<p>The 2014-2020 National Waste Prevention Programme develops waste prevention policy by reducing the generation, reuse and lengthening of product lifespan, 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.</p> <p>For each type of waste, the Plan sets a number of qualitative and quantitative targets focusing on recovery, reuse, recycling, energy recovery and ultimately landfilling, as well as relevant measures to achieve them and monitoring indicators. It also provides for the reduction of landfilling of biodegradable waste through recovery, recycling, composting and biomethanisation.</p>	<p>The NECP foresees a reduction of GHG emissions in the waste sector to 1990 levels by 2030. The following measures provided for in the NECP incorporate to a greater or lesser extent waste management:</p> <ul style="list-style-type: none"> <li>- Measure 1.15. Development of biogas and biomethane.</li> <li>- Measure 1.16. Hydrogen development renewable.</li> <li>- Measure 1.21. Specific programmes for biomass harvesting.</li> <li>- Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors</li> <li>- Measure 1.33. Reduction of GHG emissions in waste management</li> <li>- Measure 1.35. Forest sinks</li> </ul>
<p><b>National Framework Plan for Waste Management (PEMAR) 2016-2022</b></p>	<p>The ultimate objective of the National Waste Management Framework Plan, as well as EU waste policy, is to turn Spain into a resource-efficient society, moving towards a circular economy. In other words, replacing a linear economy based on producing, consuming and throwing, with a circular economy in which the materials contained in waste are re-incorporated into the production process for the production of new products or raw materials.</p>	<p>The NECP foresees a reduction of GHG emissions in the waste sector to 1990 levels by 2030. The following measures provided for in the NECP incorporate to a greater or lesser extent waste management:</p> <ul style="list-style-type: none"> <li>- Measure 1.15. Development of biogas and biomethane</li> <li>- Measure 1.21. Specific programmes for biomass harvesting.</li> <li>- Measure 1.32. Reduction of GHG emissions in the agricultural and livestock sectors.</li> <li>- Measure 1.33. Reduction of GHG emissions in waste management.</li> <li>- Measure 1.35. Forest sinks</li> </ul>
<p><b>6th general plan for radioactive waste (PGRR)</b></p>	<p>The General Plan for Radioactive Waste (PGRR) is the document setting out the strategies and activities to be carried out in Spain in relation to radioactive waste, the decommissioning of nuclear installations and their economic and financial study. It is approved by the Council of Ministers and regularly reviewed and updated.</p> <p>In addition, the National Integrated Energy and Climate Plan 2021-2030 (PNIEC) provides for the orderly closure of the Spanish Nuclear Power Plants over the period 2027-2035, which implies a change to the scenario provided for in the 6th GRWP and consequently updated in a 7th Plan in 2022, currently under public review.</p>	<p>The PNIEC, when developing the measures that may entail the closure and decommissioning of nuclear power plants, must comply with the provisions of the Plan, so there is an interrelationship between the two plans around this measure.</p> <p>The NECP also sets out the improvement that leads to the shift to renewable energies in relation to intensive water consumption for nuclear power plants, according to the measures of the decarbonisation dimension and the design of an energy mix.</p>

## 11. Population, human health and material assets

Planning instrument	Objectives or prescriptions of the planning instrument with which the NECP can interact	Significant interactions of the NECP with the objectives of the planning instrument
<p><b>National Strategy for Protection of the Citizen</b></p>	<p>It develops an analysis of the main natural, human and technological threats and risks that can lead to emergencies or disasters in Spain, as well as strategic commitments to the challenge of climate change. Its lines of action to integrate, prioritise and coordinate objectives and measures are in line with the National efforts to optimise the resources available for managing them.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the National Civil Protection Strategy.</p>
<p><b>State Civil Protection Plan for Forest Fire Emergencies</b></p> <p>HYPERLINK "<a href="https://www.boe.es/buscar/doc.php?id=BOE-A-2014-11493">https://www.boe.es/buscar/doc.php?id=BOE-A-2014-11493</a>"</p>	<p>The purpose of the State Plan is to establish the organisation and procedures for action to ensure an effective response from all public administrations in cases of forest fires in which the national interest is present, and, in other cases, to provide necessary support to the Autonomous Communities' plans when they require it.</p> <p>Furthermore, the State Plan facilitates collaboration of the Autonomous Communities' plans with each other, establishing the mechanisms to enable resources and resources from one to the other to be provided in a coordinated manner.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the State Civil Protection Plan for Forest Fire Emergencies.</p> <p>In this regard, Measure 1.35. Forest sinks, includes concrete actions such as a4. Carrying out forestry work for forest fire prevention and a5. Controlled grazing in strategic areas for forest fire prevention</p>
<p><b>State plan for Civil protection against the Seismic Risk</b></p>	<p>The objective of the State Plan is to establish the organisation and procedures for the operation of those services of the State and, where appropriate, of other public and private entities, which are necessary to ensure an effective response to the various seismic situations that may affect the country.</p>	<p>The NECP does not present measures or actions that directly affect the objectives pursued by the State Plan for Civil Protection against Sismic Risk.</p>
<p><b>State plan for Civil protection against the Volcanic risk</b></p>	<p>The objective of the State Plan is to establish the organisation and procedures for action to ensure an effective response from all the public administrations in the event of a volcanic risk emergency 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 plan.</p>	<p>The NECP does not present measures or actions that directly affect the objectives pursued by the State Plan for Civil Protection against Volcanic Risk.</p>
<p><b>StatePlan for Civil Protection against the Risk of Floods</b></p>	<p>The objective of the State Plan is to establish the organisation and operating procedures of those services of the State and, where appropriate, of other public and private entities, which are necessary to ensure an effective response to various types of floods that may affect Spain.</p> <p>The State Plan for Civil Protection against Floods is operationally based on the Special Civil Protection replacing agricultural crops in flood areas and a.7. Plans against this risk or, failing that, on the Hydro-forestry restoration in areas at high risk of territories of the Autonomous Communities concerned.</p>	<p>The NECP is a planning tool that responds to Spain's commitments to the challenge of climate change. Its objectives and measures are in line with the State Plan for Civil Protection against the Risk of Floods.</p> <p>In this regard, Measure 1.35. Forest sinks include concrete actions such as a.2. Promotion of sprouts and a.7. Hydro-forestry restoration in areas at high risk of erosion</p>
<p><b>StatePlan for Civil Protection against Radiological Risk</b></p>	<p>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 other public and private entities, which are necessary to ensure an effective response by all the public administrations to the various situations of radiological emergency, which have an impact on the population, in which the national interest is present, as well as the mechanisms to support the plans of the Autonomous Communities in the cases that require it.</p>	<p>The NECP does not present measures or actions that directly affect the objectives pursued by the State Plan for Civil Protection against Radiological Risk.</p>

Planning instrument	Objectives or prescriptions of the instrument planning with which you can interacting the NECP	Significant interactions of the NECP with the objectives of the instrument of planning
<p><b>State Plan for Civil Protection against the Risk of Maremotos</b></p>	<p>The purpose of the State Plan is to establish the organisation and operating procedures of those resources and services of the State and, where appropriate, of other public and private entities, which are necessary to ensure a response.</p> <p>the effectiveness of the public administrations as a whole, given the different emergency situations in the event of the possible occurrence of a tsunami on any part of the Spanish coasts, in which the national interest is present, as well as the mechanisms to support the plans of the Autonomous Communities in cases where this is required.</p>	<p>The NECP does not present any measures or actions that directly affect the objectives pursued by the State Plan for Civil Protection against the Risk of Maremotos.</p>
<p><b>General State Plan of Emergencies of Protection of the Citizen (PLEGEM)</b></p>	<p>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 other public and private entities, which are necessary to ensure an effective response from all the administrations.</p> <p>Public, in view of the different situations of civil protection emergency, in particular of a non-specific nature and multi-hazard nature, and crises of all kinds, including those with a low probability of occurrence, but with a very high impact, and to which ordinary plans do not provide an adequate response, in which national interest is present, as well as the mechanisms to support Autonomous Communities' plans in the scenarios that require it.</p>	<p>The NECP does not present any measures or actions directly affect the objectives it pursues the General State Emergency Plan of Civil protection.</p>

## 12. Research & innovation

<p><b>Spanish Strategy for Science, Technology and Innovation (EECTI 2021-2027)</b></p>	<p>EECTI is the multiannual reference framework for the promotion of scientific, technical and innovation research setting out the objectives shared by all public administrations.</p> <p>In particular, 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 political priorities of the European Union by aligning with its R &amp; D &amp; I programmes and addressing the challenges of national strategic sectors through R &amp; D &amp; I, for the benefit of social and economic development.</p>	<p>The EECTI 2021-2027 defines a number of strategic lines in priority sectors and major driving projects, including the strategic area of Climate, Energy and Mobility. Strategic actions in this area focus on the following sectors:</p> <ul style="list-style-type: none"> <li>- Climate change and decarbonisation</li> <li>- — Sustainable mobility</li> <li>- Sustainable cities and ecosystems</li> </ul> <p>The NECP through the measures adopted in its research, innovation and competitiveness dimension, in line with the objectives and principles set out in the EECTI, will contribute to a comprehensive and systemic response to adequately achieve the objectives set in the research and innovation dimension across the energy and climate value chain.</p>
<p><b>State</b> HYPERLINK "<a href="https://www.boe.es/boe/dias/2015/11/21/pdfs/BOE-A-2015-12571.pdf">https://www.boe.es/boe/dias/2015/11/21/pdfs/BOE-A-2015-12571.pdf</a>"Plan for</p>	<p>industrial and environmental in our country.</p> <p>The Spanish Strategy for Science, Technology and Innovation (EECTI) is developed within the General State Administration through the multiannual National Plan for Scientific and Technical Research and Innovation (PEICTI), which sets out its scientific, technical and social priorities.</p> <p>In the 2021-2023 PEICTI, the strategic lines defined in the Strategy are developed through strategic actions (IA), which are programmatic actions that channel sectoral policies towards the strategic lines defined and which constitute the areas of national smart specialisation. Among the strategic actions defined in the 2021-2023 EIRP are the EA on Climate, Energy and Mobility, which is developed in the three strands identified in the Strategy, climate change and decarbonisation, sustainable mobility, sustainable cities and ecosystems and adds a fourth strand, the energy transition.</p>	<p>Within the strategic lines of the PEICTI, programme actions are defined, with different forms of participation and funding instruments, which are articulated through the resources identified in the sectoral strategies, which may be managed by separate units, both within the MCIN and other ministerial departments.</p> <p>In particular, the actions in the climate, energy and mobility EA 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 Climate Change (PNACC 2021-2030), the Secure, Sustainable and Connected Mobility Strategy 2030 and other strategies and roadmaps linked to the energy transition.</p>

**Objectives or prescriptions of the Planning instrument** planning instrument with which the NECP can interact

**Significant interactions of the NECP with the objectives of the planning instrument**

## ANNEX I. PROGRESS IN DEVELOPING MEASURES

The following table shows the estimate of progress in the development of the measures designed in the 2021-2030 NECP.

**Table I.1. Progress in compliance with the measures of the NECP 2021-30**

3.1 DECARBONISATION DIMENSION		
	MEASURED	STATE
Measure d	1.1. Desa rrol lo de new i nsta l ACI (ACI) for electricity generation with renova bl is	3
Measure d	1.2. Management of nda dema, macena and exi bi lity	3
Measure d	1.3. Adaptation of electricity grids for the integration of renewables	2
Measure d	1.4. Desarro from utoconsumable with reove and l generation distri buida	3
Measure d	1.5. Addition of renova bl is in the sector i ndustria l	2
Measure d	1.6. MA rco pa turns the rock-run of thermal renewable energy.	3
Measure d	1.7. Biocombusti bles ava nza two in the tra ns	3
Measure d	1.8. Promotion of renove gases	3
Measure d	1.9. Pla n de renova ci on technology in existing projects for the generation of electric energy using renewable energy	2
Measure d	1.10. Promotion of the procurement of bi latera l of electrical energy from renova bl e	2
Measure d	1.11. Great Many is a beautiful source of biomass.	1
Measure d	1.12. Projects if the pour res and strategy goes to energy to bei bl e in the case of youths	3
Measure d	1.13. Local energy communities	3
Measure d	1.14. Promoting the proactive role of citizens in de-carbonisation	3
Measure d	1.15. Just Transit Strategy	3
Measure d	1.16. Public procurement of energy re nova bl e	2
Measure d	1.17. Vocational training is in the renova bl energy sector.	2
Measure d	1.18. Review and whether MPL Motion of Proceedings to Nistrative DMI	2
Measure d	1.19. Knowledge generation, dissemination and awareness raising	1
Measure d	1.20. European Emissions Trading System	2
Measure d	1.21. Reduction of GHG emissions in the agricultural and livestock sectors	2
Measure d	1.22. Reduction of GHG emissions in waste management	2
Measure d	1.23. Reduction of GHG emissions related to uorinated gases	2
Measure d	1.24. Foresta sinks	2
Measure d	1.25. Agricultural Sumide	2
Measure d	1.26. Taxation	1

Table I.1 Progress on compliance with the measures of the NECP 2021-30

3.2 ENERGY EFFICIENCY DIMENSION	
MEASURED	STATE
Measure 2.1. Low emission zones and modal shift measures	3
Measure 2.2. More effective use of the means of transport	3
Measure 2.3. Re Novaci on from pa rque to lystic utomovi	2
Measure 2.4. Promotion of electric vehicles	3
Measure 2.5. Improvements in technology and process management systems i ndustri to	2
Measure 2.6. Energy efficiency in existing buildings in the residential sector	3
Measure 2.7. Re Novaci of the equi pa miento resi dencia l	3
Measure 2.8. Energy efficiency in buildings in the tertiary sector.	3
EFi ci energetic value in equi leads to cold and gra ndes i nsta air conditioning of the tertiary sector and public nfrastructures	3
Measure 2.10. Energy efficiency on farms, irrigation communities and grapevine machinery	1
Measure 2.11. Promotion of energy services	2
Measure 2.12. Sugar sector: answer bi l proactively and recruit ci ón alpul i ca efficient energy	3
Measure 2.13. Energy audits and management levers	2
Measure 2.14. Training of professionals in the energy efficiency sector	2
Measure 2.15. Communication and training in the energy efficiency sector	1
Measure 2.16. Other measures to promote energy efficiency: Transition in the high-efficiency cogeneration	2
Measure 2.17. Fine nail measurements: National Energy Efficiency Fund	2
3.3 DIMENSION OF ENERGY SECURITY	
MEASURED	STATE
Measure 3.1. MA nteni my minds of minimum stocks of insurance of petroleum products and gas	3
Measure 3.2. Reduction of dependence on oil and rum on the islands	2
Measure 3.3. Straight points from combusti to lternative	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	2
3.4 DIMENSION OF THE INTERNAL ENERGY MARKET	
MEASURED	STATE
Measure 4.1. Increase in electricity interconnection with France	1
Measure 4.2. Increase in electricity interconnection with Portuga l	1
Measure 4.3. Electricity transmission infrastructure other than Projects of Common Interest (PCIs)	3
Measure 4.4. Integration of electric dip	3
Measure 4.5. Protecting electricity consumers and increasing 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 retail gas sector	1
Measure 4.10. Gas Demand Management Dearrot Plan	1
Measure 4.11. Fight against energy poverty	3



Table I.1 Progress on compliance with the measures of the NECP 2021-30

3.5 RESEARCH DIMENSION INNOVATION AND COMPETITIVENESS		
	MEASURED	STATE
Measured	5.1. Strategic Action in Energy and Climate	3
Measured	5.2. Implementation of the SET-Plan	3
Measured	5.3. Network of Excellence in Energy and Climate	3
Measured	5.4. Increase, coordination, improvement and efficient use of scientific and technological infrastructure and equipment in energy and climate	3
Measured	5.5. Public purchase of green nation	2
Measured	5.6. Fortalecimiento del Capital Riesgo Pública para la Transferencia de Tecnología en Energía y Clima	3
Measured	5.7. New instruments from policy to investigation and to innovation in Energy and Climate	3
Measured	5.8. Social Innovation for Climate	1
Measured	5.9. Reducing bureaucratic limits and cutting off DMIs administrativas para encourages the recruitment of slow researchers in climate and energy	2
Measured	5.10. Relaunching the City of Energy Foundation, CI UDEN	3
Measured	5.11. Science, Technology and Innovation Information System for Safeguarding Funding	3
Measured	5.12. R & I + c is about the Spanish energy system for climate change	2
Measured	5.13. Praise more if you turn to the regional plan on scientific and technological topics that are strategic in the energy and climate stream	2
Measured	5.14. Increase Spanish participation in programmes for the financing of European innovation and research	2
Measured	5.15. Support for RTICs of Spanish investigation groups in forums international for energy and climate	3
Measured	5.16. Promotes iniciativa Misión Innovation	4
Measured	5.17. Mecanismos de financiación de Innovación europea	3
Measured	5.18. International cooperation	3

## INDEX OF FIGURES

Figura 2.1. Emisiones de CO <sub>2</sub> eq por sector. Histórico y proyección a 2030 (ktCO <sub>2</sub> eq) .....	67
Figura 2.2. Objetivo de emisiones 2030. Serie histórica (2005 - 2020) y trayectoria prevista .....	68
Figura 2.3. Asignaciones de emisiones frente a trayectoria prevista, 2021-2030 .....	69
Figura 2.4. Aportación de las energías renovables sobre el consumo final de energía con el conjunto de medidas previstas .....	70
Figura 2.5. Evolución de la potencia instalada por tecnología (MW) .....	73
Figura 2.6. Objetivo acumulado de ahorro de energía final: 2021-2030 .....	84
Figura 2.7. Mix de energía primaria en España en 2019 y 2030 (ktep) .....	89
Figura 2.8. Dependencia energética en España en 2019 y 2030 .....	90
Figura 2.9. Situación respecto de los tres umbrales que recoge el documento COM (2017)718 .....	95

Figura 3.1. Senda de emisiones difusas históricas y proyectadas .....	186
Figura 3.2. Proyección de la contabilidad LULUCF según Reglamento (UE) 2018/841 de las emisiones/absorciones de CO <sub>2</sub> eq acumuladas en el periodo 2026-2030 .....	200
Figura 3.3. Ahorro de energía final acumulada por sectores en España 2021-2030 (ktep) .....	208
Figura 3.4. Ahorro de energía final acumulada por medidas en España 2021-2030 (ktep) .....	209
Figura 3.5. Previsión indicativa anual de viviendas rehabilitadas energéticamente 2021-2030 .....	234
Figura 3.6. Mix de energía primaria en España en 2019 y 2030 (ktep) .....	277
Figura 3.7. Localización de las reservas estratégicas en España en 2021 .....	281
Figura 4.1. Metodología: inputs y outputs de los modelos DENIO y TM5-FASST .....	429
Figura 4.2. Reparto de las inversiones totales según tipo de medidas .....	430
Figura 4.3. Reparto de las inversiones totales según fuente de financiación .....	431
Figura 4.4. Variación del PIB por tipo de medidas (M€/año) .....	432
Figura 4.5. Impacto en el empleo por tipo de medidas (miles de personas/año) .....	433
Figura 4.6. Impacto en el empleo por ramas de actividad (miles de personas/año) .....	434
Figura 4.7. Impacto en las cuentas del sector público: ingresos (M€)Fuente: BC3 .....	435
Figura 4.8. Impacto en las cuentas del sector público: gastos (M€) .....	435
Figura 4.9. Impacto sobre los hogares por quintiles de renta (%) .....	436
Figura 4.10. Emisiones de contaminantes atmosféricos en 2030 (% respecto a 2019) .....	437
Figura 4.11. Impacto en la salud (muertes prematuras) .....	438
Figura 4.12. Análisis de sensibilidad a los precios de los combustibles fósiles: PIB (M€/año) .....	439
Figura 4.13. Análisis de sensibilidad a los precios de los combustibles fósiles: empleo (miles de personas/año) .....	440
Figura A.1. Potencia de electrolizadores en 2030 en .....	461
Figura A.2. Capacidad de Almacenamiento en 2030 en la Estrategia y en el PNIEC .....	462
Figura A.3. Producción de biogás 2030 en la Hoja de Ruta y en el PNIEC .....	463
Figura A.4. Potencia de eólica marina en 2030 en la Hoja de Ruta y en el PNIEC .....	464
Figura A.5. Capacidad de Autoconsumo en 2030 en la Hoja de Ruta y en el PNIEC .....	465
Figura A.6. Evolución de la longitud de la red de transporte .....	478
Figura A.7. Mapa de la infraestructura de gas .....	479
Figura A.8. Evolución de la longitud de las redes de transporte y distribución de gas natural (km) .....	480
Figura A.9. Evolución del precio de los mercados de gas .....	485
Figura A.10. Precio del gas natural para un consumidor doméstico en la UE y otros países europeos en el primer semestre de 2022 (€/kWh) .....	488
Figura A.11. Distribución del gasto en I+D+I por tecnologías .....	497
Figura B.1. Metodología .....	505
Figura B.2. Esquema de entradas y salidas de TIMES - Sinergia .....	507
Figura B.3. Estructura de datos de TIMES-Sinergia .....	508
Figura B.4. Parámetros que caracterizan las tecnologías en TIMES-Sinergia .....	508
Figura B.5. Entorno Europeo considerado. Fuente. ENTSO-E .....	521
Figura D.1. Entorno Europeo considerado. Fuente. ENTSO-E .....	544
Figura D.2. Coste de generación por tecnologías del escenario H2030.....	549
Figura D.3. Potencia instalada en el Sistema Español Peninsular escenario MITECO Adaptado H2030..	551
Figura D.4. Resultados Escenario PNIEC 2023-2030 H2030 .....	554
Figura D.5. Valores anuales de demanda y de la punta de demanda media horaria en cada uno de los años climáticos modelados .....	558
Figura D.6. Indisponibilidades programadas de ciclos combinados .....	559
Figura D.7. Indisponibilidades programadas de nucleares .....	559
Figura F.1. Objetivo provisional acumulado de ahorro de energía final: 2021-2030 .....	571
Figura F.2. Ahorro de energía final acumulada por sectores en España 2021-2030 (ktep) .....	572
Figura F.3. Ahorro de energía final acumulada por medidas en España 2021-2030 (ktep) .....	573
Figura G.1. Clasificación de los agentes según tipología y ámbito .....	588
Figura G.2. Clasificación de las aportaciones según dimensiones .....	589

## TABLE INDEX

Tabla 1.1. Proceso de actualización del PNIEC .....	45
Tabla 2.1. Comparativa de objetivos y resultados entre el PNIEC 2021-2030 y el documento actualizado .....	65
Tabla 2.2. Evolución de las emisiones (miles de toneladas de CO2 equivalente) .....	66
Tabla 2.3. Objetivos de absorciones netas de gases de efecto invernadero (MtCO2eq).....	70
Tabla 2.4. Evolución de la potencia bruta instalada de energía eléctrica (MW) .....	72
Tabla 2.5. Desarrollo de los Planes Nacionales de Adaptación al Cambio Climático (PNACC) .....	74
Tabla 2.6. Evolución del consumo de energía final, excluidos usos no energéticos(ktep) .....	82
Tabla 2.7. Evolución de la ratio de dependencia energética primaria (ktep).....	89
Tabla 2.8. Objetivos y prioridades .....	107
Tabla 3.1. Medidas del Plan .....	111
Tabla 3.2. Proyección de la contabilidad LULUCF según Reglamento (UE) 2018/841 de las emisiones/absorciones de CO2eq acumuladas en el periodo 2021-2025 .....	199
Tabla 3.3. Evolución de la localización de reservas estratégicas de productos petrolíferos en España ..	281
Tabla 3.4. Objetivos de pobreza energética .....	306
Tabla 3.5. Guías informativas de buenas prácticas elaboradas .....	365
Tabla 3.6. Matriz de interrelaciones entre políticas y medidas .....	414
Tabla A.1. Comparativa de objetivos y resultados entre el PNIEC 2021-2030 y el documento actualizado .....	443
Tabla A.2. Proyección del PIB de España .....	444
Tabla A.3. Proyección de la población española .....	444
Tabla A.4. Proyección del número de viviendas .....	445
Tabla A.5. Precios internacionales de los combustibles fósiles .....	445
Tabla A.6. Proyección del coste del derecho de emisión de CO2.....	446
Tabla A.7. Fuentes de datos para la evolución de costes tecnológicos.....	446
Tabla A.8. Proyección de emisiones totales en el Escenario PNIEC 2023-2030 .....	447
Tabla A.9. Proyección de emisiones en los sectores sujetos al comercio de derechos de emisión .....	448
Tabla A.10. Proyección de emisiones en los sectores difusos.....	448
Tabla A.11. Porcentaje de energías renovables sobre consumo energía final en el Escenario PNIEC 2023-2030 .....	449
Tabla A.12. Porcentaje de energías renovables en calor y frío .....	450
Tabla A.13. Reducción de la intensidad de emisiones de GEI por el uso de combustibles renovables en el sector del transporte .....	450
Tabla A.14. Porcentaje de energías renovables en el sector del transporte.....	450
Tabla A.15. Cumplimiento de los límites fijados en la Directiva 2018/2001 en el sector del transporte	451
Tabla A.16. Porcentaje de energías renovables en el sector de generación de energía eléctrica .....	452
Tabla A.17. Parque de generación de energía eléctrica en el Escenario PNIEC 2023-2030 .....	453
Tabla A.18. Generación eléctrica bruta del Escenario PNIEC 2023-2030.....	455
Tabla A.19. Balance eléctrico del Escenario PNIEC 2023-2030 .....	455
Tabla A.20. Consumo primario de energía incluyendo usos no energéticos en el Escenario PNIEC2023-2030 .....	456
Tabla A.21. Consumo final de energía incluyendo usos no energéticos en el Escenario PNIEC 2023-2030 .....	457
Tabla A.22. Consumo de energía final en el sector industrial (excluidos usos no energéticos) para el Escenario PNIEC 2023-2030 .....	458
Tabla A.23. Consumo de energía final en el sector residencial (excluidos usos no energéticos) para el Escenario PNIEC 2023-2030 .....	458
Tabla A.24. Consumo de energía final en el sector servicios y otros (excluidos usos no energéticos) para el Escenario PNIEC 2023-2030 .	459
Tabla A.25. Consumo de energía final en el sector transporte (excluidos usos no energéticos) para el Escenario PNIEC 2023-2030 .....	459

Tabla A.26. Intensidades energéticas de energía primaria y final en el Escenario.....	460
Tabla A.27. Intercambios internacionales físicos anuales por frontera .....	467
Tabla A.28. Evolución de la ratio de dependencia energética primaria del Escenario (ktep) .....	468
Tabla A.29. Capacidad comercial de intercambio eléctrico .....	473
Tabla A.30. Evolución de potencia eléctrica de generación instalada España-Portugal .....	474
Tabla A.31. Ratio de interconexión eléctrica.....	474
Tabla A.32. Instalaciones de la red de transporte en España .....	478
Tabla A.33. Evolución de la red de transporte de 400 y $\leq$ 220 kV (km de circuito) .....	478
Tabla A.34. Plantas de regasificación .....	481
Tabla A.35. Componentes del precio final medio de electricidad. Demanda peninsular. Precios en barras de central .....	482
Tabla A.36. Operaciones del mercado organizado de gas, MIBGAS .....	484
Tabla A.37. Cuotas de los operadores en mercado minorista de gas - 1 .....	486
Tabla A.38. Cuotas de los operadores en mercado minorista de gas - 2 .....	487
Tabla A.39. Precio medio del gas natural doméstico e industrial por bandas de consumo.....	489
Tabla A.40. Subvenciones a la energía 2020-21 .....	494
Tabla A.41. Medidas para eliminar la dependencia de combustibles fósiles.....	496
Tabla A.42. Distribución de la financiación pública por instrumentos y modalidades de participación ..498	
Tabla A.43. Parámetros, variables y balances del Escenario PNIEC 2023-2030 .....	499
Tabla A.44. Proyecciones de gases de efecto invernadero, por gases y categorías .....	503
Tabla B.1. Periodos temporales. Distribución anual .....	509
Tabla B.2. Periodos temporales. Distribución diaria del número de horas.....	509
Tabla B.3. Periodos temporales. Franjas horarias .....	509
Tabla B.4. Elasticidades precio (propias y cruzadas) y elasticidades de ingreso .....	533
Tabla C.1. Tabla resumen de los principales elementos de la lucha contra el cambio climático en España .....	536
Tabla D.1. Precios de combustible y de emisiones CO2 considerados para horizonte 2030 .....	547
Tabla D.2. Factores de emisiones por tecnologías consideradas en el modelo europeo .....	548
Tabla D.3. Horas de funcionamiento anuales por tecnología .....	549
Tabla D.4. Valores de demanda Escenario PNIEC 2023-2030 MITECO .....	550
Tabla D.5. Potencia instalada Escenario PNIEC 2023-2030 MITECO .....	550
Tabla D.6. Valores de interconexión España-Francia, España-Portugal .....	551
Tabla D.7. Resultados escenario PNIEC 2023-2030 H2030 .....	552
Tabla D.8. Resultados del análisis probabilístico de la cobertura. Escenario PNIEC 2023-2030 horizonte 2030. Caso Base. España .....	561
Tabla E.1. Interacciones entre el PNIEC y los ODS .....	564
Tabla F.1. Consumo de energía final para los años 2016, 2017 y 2018 y promedio (ktep) .....	570
Tabla F.2. Medidas de eficiencia energética para el período 2021-2030 (ktep) .....	572
Tabla F.3. Programas de actuación con cargo al FNEE (2021-2030) .....	578
Tabla F.4. Programas de actuación alternativos (2021- 2030) .....	581
Tabla F.5. Medidas fiscales previstas en el PNIEC para el periodo 2021-2030 .....	584
Tabla G.1. Programa de las Jornadas de Trabajo para la Actualización del Plan Nacional Integrado de Energía y Clima .....	590
Tabla I.1. Avance en el cumplimiento de las Medidas del PNIEC 2021-30.....	629