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NATIONAL ENERGY AND CLIMATE PLAN —

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CHAPTER 1: OVERVIEW AND PROCESS FOR DRAWING UP THE PLAN

1.1 Introduction and starting point

The National Energy and Climate Plan (NECP) is the country's roadmap for the energy transition. The text serves three purposes. First, it explains the overall strategy on how the country will achieve climate neutrality in 2050. Secondly, it presents the policies that will facilitate the achievement of the target, with emphasis on the intermediate stage of 2030. And third, it quantifies with figures that translate policy into a baseline scenario, thus giving an insight into the main trends and size classes of the various variables.

This text is a draft of the revised NECP which is expected to be presented in June 2024. Updating the NECP is an obligation towards European legislation. But it is also an opportunity to adapt the national strategy to the new situation that has emerged in recent years. Since 2019, huge changes have taken place in the world – changes that the new NECP has to incorporate.

In 2018, the Intergovernmental Panel on Climate Change (IPCC) issued the first detailed analysis of the global impact of an increase in average temperature of 1,5 degrees Celsius relative to the pre-industrial era. The text concluded that such a change would have a major-impact on life on the planet. The report prompted states to try to limit temperature rise as close as possible to^{1,5} °C.

Since then, a number of organisations, mainly the International Energy Agency (IEA), have presented detailed scenarios for achieving climate neutralityin 2050. Today, the roadmaps at our disposal are clearer andmore detailed than those that existed a few years ago. The new NECP is therefore based on a more robust basis because international literature has been significantly enriched.

Developments over the past few years have profoundly changed the economy andmarkets. The pandemic was a global shock that greatly reduced demand and prices for land, but at the same time triggered an ambitious response from the European Union – a response that created new resources (the Recovery Resilience Fund – TAA), which Greece is using to accelerate the energy transition. Many of the actions described in the NECP are possible due to the TAA, which did not exist in 2019.

The gradual exit from the pandemic has also led to rising energy prices – for gas and carbon prices (CO_2), the rise was unprecedented. In early 2022, this was followed by Russia's invasion of Ukraine, which boosted prices – especially gas – at new heights. The energy crisis that thrivedis the outline in which the NECP was written. Five main trends are worth noting.

First, the price surge completely changes the idle or non-changeover scenario. In2022, Greece lost more than EUR 7 billion in natural gas imports, compared with EUR 1 billion on average in the years preceding the crisis. The state channelled almost EUR 10 billion to protect households and businesses from the effects of accuracy – an amount equal to 4.8 % of Gross Domestic Product (GDP) for that year. The cost of CO_2 emissions has also risen. Therefore, the scenarioof a slow transition – with more gas and more pollutants – has a higher cost today than when the 2019 NECP was designed. A logicalconjunctive bathroom is that investment in alternative fuels and technologies is nowmore prevalent.

Secondly, the energy crisis led to a significant drop in demand fornatural gas in 2022 (19 %) and electricity (6.7 %) for the whole territory. . These new developments create a new starting point for the NECP, while acknowledging the difficulty of integrating the latest data into the-energy simulations. In addition, the 2023 statistics confirm these trends, indicating that the changes we observed in 2022 may be permanent rather than temporary.

Thirdly, energy flows in South-East Europe have changed. Greece imported much more liquefied natural gas and increased gas exports to Bul gariaand other countries. The new landscape in the region creates significant opportunities for Greece to deepen the role it has already played as a pillar of energy crunchin the region. It is also a new variable that the NECP needs to incorporate.

Fourth, the energy crisis has changed Europe's strategy, the main thingbeing to move away from Russian fossil fuels and accelerate the energy transition. New targets are set for alternative fuels (e.g. hydrogen, biomethane, etc.), with a strong focus on production chains and strengthening Europe's resilience.

Finally, the increase in prices brought about by the crisis affects a number of policies of the NECP under revision. It creates a need to reduce energy prices, protect vulnerable households, but also limit cost increases for specific actions and infrastructure. At the economic level, rising interest rates are changing the financial situation, increasing the cost of borrowing and hence the cost of new investment.

It is obvious that the changes brought about by the energy crisis interact with other trends, structural and long-lasting. Globally, we are seeing the continuous decrease in the cost of photovoltaics, wind farms and batteries, despite theplaque pressures observed in 2022. In Greece, installed capacity from photovoltaic and wind doubled in four years, and renewable energy sources (RES) account for almost half of the production of the country's interconnected system.

Changes in energy coincide with a new climate for our country. The return to the investment grade thanks to the positive evaluation of the Greekeconomy closes a cycle that has lasted for more than a decade. Greece now has access to new funds that can be channelled into the energy transition. Faster economic growth also creates a positive momentum for investment – but also leads to an increase in fuel consumption (mainly for road transport and transport) – which is a challenge for the elaboration of a NECP.

At the same time, Greece is already experiencing the consequences of the climate crisis. The July 2023 heatwake was the longest in history. The intense fires thatoccurred in Greece – especially in Evros, Rhodes and Attiki – burned morethan 1 % of the country, four times the annual average over the last 15 years. The unprecedented floods in Thessaly caused-incalculable disasters. These repercussions underline the imperative of a bottom-upbasis. On the other hand, they increase the necessary and urgent focus on ensuring the resilience of Greek society and economy.

It is in this context that this draft of the revised NECP– annexed to the trends and dynamics of 2023, focusing on policies thatare inalienable to achieve emission reductions by the year 2030, but also taking into account the broad picture of climate neutrality towards the year 2050.

1.2 Summary of strategy and objectives for 2030

1.2.1 national strategy framework

The national energy and climate strategy is the result of an interaction of three variables:

- **First, international trends set out the outline in which Greece can move.**

RES costs continue to decrease. This is an international trend that createsgood weather for our country, because it can take advantage of its excellent solar and winddusty. The gradual maturation of floating offshore wind farms is another example that opens a new horizon for Greece – energy production in the Aegean and Ionian waters. The progressive convergence of the costs of new electric cars with conventional cars creates another window of opportunity to accelerate electromobility. **On the other hand, there are a number of new technologies that are notmature even requiring significant state aid**. Hydrogen, synthetic fuels and batteries, as energy storage media, are included in this category. In shipping, oil alternatives are still at an early stage. In these markets, Greece must define the optimal mix of targets for the speed and nature of the transition. It cannot be abstained, but it is self-evident that it does not have unlimited resources to be able to grow everywhere at the same speed.

- **The second variable influencing the elaboration of a national strategy is thecurrent situation. Greece has already made leaks in the installation of RES participating in the electricity market.**

In 2022, in 7, we had the highest share in the world in terms of sun penetration ofelectricity generation. Production from lignite has already decreased by 80 %. The mix of electricity strategies therefore starts from a completely different base in 2023 than in 2019.

In other sectors – apart from electricity generation – we have the following starting points. In buildings, 60 % of the country's building stock belongs to the lowest energy classes (E-G) and more than half was built before 1980, soheat insulation. There is also a significant gap between the national built environment and the EU average, as shown in the shares of low-performing buildings. These buildings usually have significantly lower resilience against rising energycosts as well as extreme weather events due to the clonalchange already taking place in Greece (e.g. floods, heat waves). . Atthe same time, the effects of the economic crisis with significantenergy poverty can still be observed. In contrast, tertiary sector buildings are based mainly on electricity already, so the need for intervention is different. However,on the basis of energy intensity in the commercial and public buildings sector, since 2017, Greece has surpassed the EU-27 average, highlighting the high potential for efficiency gains in energy use in commercial buildings. In transport, the vehicle fleet of all categories in Greece is older than the European average (with an average age of passenger vehicles in Greece at 17 years significantly higher than the European average of 12 years), which creates the need but also represents an opportunity for a rapid renewal of the fleet in thecoming decade. In industry, we have a high rate of electrification, while heavy manufacturersthat have no alternative energy source to fossil fuels are veryhigh, at least in relation to the rest of Europe.

- The**third variable is the resources available for the transition**.

On the one hand, the continuous drop in costs for RES installation reduces the need for public subsidies (in 2022, RES contributed to the state budget, helping to alleviate bills for households and businesses). On the other hand, there are a number of technologies that will need to leverage public money.

The NECP should align the available resources with the targets, aiming at an optimal mix that does not simply reduce emissions, but also aligns the national strategy with the achievement of other objectives such as reducing energy poverty, just transition in lignite regions, connecting islands with the continental electricitysystem, creating production and added value chains in the ElGroup, etc.

The question of resources has a certain uncertainty. The resources from the UDF1 have been instrumental in the significant saving wave in the country, enabling strategic investments in energy storage (pumped storage and batteries), and in the promotion of electromobility (charging infrastructure and zero-emission vehicles), as well as other flagship projects. In 2019, this source of funding did not exist. A series of discussions are taking place at European level that can drastically influence the availability of resources that Greece can channel into the energy transition.

A second uncertainty relates to the Emissions Trading System (ETS), which provides significant resources for our country – but flows depend on a market we can predict, only approximately. A higher price scenario boosts the competitiveness of RES but also affects the state's revenues from emissions – bringing them up in the near future but decreasing them over time, as fossil fuels are replaced by new solutions.

Greece also has access to financial tools, which are constantly configured. The Innovation Fund, for example, in its third round of funding – has launched two Greek projects for actions related to carbon capture and storage – which will accelerate the evolution of this market in Greece. The Island Removal Fund is a new tool that we integrate into the national strategy, while Greece has been granted access to the resources of theCohesion Fund since 2024. At the same time, resources are already being used for FairBase.

In conclusion, the NECP makes some assumptions about the possible resources that Greecewill mobilise, but there is a self-evident uncertainty that may have a positive or negative impact on the achievement of the objectives. There is also uncertainty in international dynamics (e.g. costs of new technologies), energy prices (which mayeven convey increased needs to support vulnerable consumers), the magnitude and costs of natural disasters, and others.

1.3 strategic priorities of the National Planfor Inland and Climate

The**draft revised NECP emphasises the reduction of emissions from electricity generation as more than 2/3 of greenhouse gas emission reductions between 2020 and 2030 come from the electricity generation sector.** It is an option in line with international experience – in most countries the reduction of emissions in electricity generation is faster than other sectors (-building, industry, transport, etc.). Electricity generation is also responsible for thelargest part

Recovery and Resilience1 Fund

of the emissions in Greece – so the NECP normally gives a strongfocus on electricity generation.

There is also an economic logic. The cost of RES has decreased, and RES are now competing with fossil fuels. Greece also has excellent wind and solar potential – so it makes perfect sense to want to make the most of it. Electrificationis therefore an area where we can achieve a major reduction in emitters,relying on abundant sources of energy, and with consequences that will reduce prices for consumers, without the need for excessive subsidies.

The policy axes in electricity generation are as follows:

Continuously reducing lignite production, with the aim of reducing it to zero after 2028.

The connection of the non-interconnected islands to the interconnected system by 2030.

Whereas RES cover ~ 80 % of electricity generation by 2030 (or earlier) – with a balanced mix between solar and wind energy.

A strong focus on the development of offshore wind farms – where Greece's potential is excellent – with the aim of making the first projects operational in 2030.

Deployment of sufficient power and capacity of energy storage systems (batteries and pumped storage).

Security of energy supply and functioning of competitive electricity markets for the benefit of consumers and the national economy

The active participation of consumers in the market through, inter alia, the maturity of the demand response framework.

Further electrification in final energy consumption with a focus on buildings and transport, as well as the promotion of RES self-generation systems

Utilisation of electricity from RES for the production of renewable fuels

- New international interconnections, with a focus on electricity exports to the EUto absorb the surrounding energy and make it easier to balance the national system.
- Digitalisation of the network.

The objectives of the NECP reflect these policies. The figures presented in the NECP are, of course, a forecast with specific assumptions. The actual bo sizestend to diverge in different places. However, these are the main pillars on which the State will move and these objectives will strive to achieve through its policies.

It is expected that the quantitatively and qualitatively significant transition in the fieldof electric energy also causes some uncertainties about the stability of thebunch. When RES reach such a high percentage (estimated at around 80 %), the balancing needs will multiply. This is obviously an issue facedby all developed countries. It is partly a technical challenge (adequacy of electricity and system stability) and partly economic (not to rotate between zero, at one end, and high levels at the other). The practicesinherent in the operation of the electricity system (production, distribution, marketing) with 80 %RES are not fully clarified. However, the NECP promotes policies that encourage and favour technically and financially optimal-implementation.

We know from many scientific analyses that the balancing of a system dominated by RES is based on a combination of technologies and practices. Zero-pollutant technologies with flexibility (e.g. nuclear, hydroelectric, geologicalone, gas with carbon capture and storage, hydrogen, etc.), cool response(from buildings, cars, industry), storage technologies (pumped storage, batteries), system diversification (so that production does not depend on a technology or geographical area), international interconnections (which can transfer energy from one place to another), and occasional energy disposal (because it is more economical than absorbing all energy at all hours).

In Greece, the system will be balanced by a combination of the above orunreasonable solutions, including:

- batteries and pumped storage,

- hydroelectric and natural gas plants;
- allocated RES and demand response;
- production of renewable gases, as well as
- through the interconnections.

At the same time, it goes without saying that the State will take the necessary measures to ensure security of supply, taking into account technological neutrality and limiting costs to consumers.

Emission reductions in other sectors (beyond electricity generation) willbe more limited from 2020 to 2030. This partly follows international trends where the electricity sector is changing more quickly. However, the starting point for our country also plays a role here. The economic crisis has significantly reduced demand forenergy in recent years: from 2007 to 2013, energy consumption fell by 39 % in industry, 28 % in transport and 30 % in housing. By 2021, there was little recovery in most sectors. **Economic growth will lead to an expected and fair increase in consumption. Therefore, in the coming years, Greece will have to balance two trends: the increase in consumption that growthwill bring about, and the energy savings (and decarbonisation) required by our energy policy. The**final result, in terms of emission reductions, may seem modest, but this reflects the counter-momentum created by the recovery of an economy that is just leaving behind the crisis years.

In housing, and in buildings in general, the primary objective is tosave jobs and combat energy poverty. A significant proportion of the Recovery Fund's resources, combined with the Partnership Agreement for the Development Framework (NSRF) and other European funds, support multiple cycles of the 'Save' programme, the 'Recycling Equipment' programme, the 'Ilektra' programme for publicbuildings, the programme for solar water heaters in homes, as well as the'Photovoltaics on the roof' in combination with batteries. The common axes are toburn up and increase the energy efficiency of the country's building stock, to improve the quality of life, to protect against high costs to meet the needsof the country, with additional targeted actions for specific vulnerable groups in need of support.

The**transport sector has shown a significant upward momentum in recentyears, the result of economic growth in Greece.** Greece has the lowest rate of penetrationof RES in the transport sector – the result of the use of trucks

(instead of railways) for goods transport, as well as the low share of biofuels in the mix. The primary objective of the NECP is to bring Greece closer to the European average in electrification of transport – especially cars and taxis. This is, in part, already the case with a significant increase in electric cars in total new car registrations in Greece. Greece is taking advantage of international trends that make electric cars increasingly competitive in terms of cost and reliability than conventional cars. At the same time, the State is supporting electrification of transport with specific incentives for private cars, corporate fleets, including light trucks (vans), taxis, and public transport.

In the coming years, the priority of the state will be to develop a more dense network of publicly accessible electric vehicle chargers (PCs). The comparator showsthat Greece is lagging behind the other European countries in its chargingnetworks. The programme for the installation of chargers is supported by the TAA and is a key pillar of the country's electro-mobility strategy – with the development of such infrastructure being a prerequisite for the additional penetration of electric vehicles in the whole vehicle fleet, reinforcing the already positive trend. In allareas of transport, international experience favours some possible solutions, which are, however, expected to be matured after 2030. The aim of the NECP is therefore to create conditions for the development of these new technologies at the right time.

Industry**is an important source of emissions for the country. In comparison with other European countries, domestic industry uses electricity and oil to**a greater extent, and less gas and RES. This creates a positive dynamic, especially in terms of electricity use and limited needs for thermal energy at very high temperatures. The short-term objective of the NECP is to create a carbon capture and storage value chain in the country that will mainly help industry in hard-to-abate industries and processes. This chain is also supported by European funds available to the country (TAA, REPowerEU) and competitive European funds (such as the Innovation Fund). As a first step, this value chain could capture and store a significant proportion of all emissions from industry (reaching 15 million tonnes per year) as early as 2030.

1.4 Objectives set by the European Union

In the period from 2020 to date, the European Union has set itself more ambitious yesterdayfor 2030 and incorporated the 2050 climate neutrality target in all Member States' National Energy and Climate Plans. With regard to this objective, the Greek Government has submitted a long-term energy and climate strategy, as a separate study in the context of the National Energy and Climate Plan. Today, however, the long-term targets and the plan to achieve themare embedded in the main National Energy and Climate Plan, which therefore covers the whole period from now to 2050, **providing more details on the plan to achieve the 2030 targets.**

The European Union (EU) set itself ambitious targets in its fight against climate change and the transition towards a more sustainable energy system. At all the objectives were formulated in the context of the EU's Clean Energy Package, which includes the Renewable Energy Directive,-the Energy Efficiency Driving and the Governance Regulation.

Below are some of the main targets set for EU Member States in the National Energy and Climate Plans (NECPs):

- **Reduction of greenhouse gas emissions: Reduce by 55 % by 2030 compared to the 1990 emission level, and reach climateneutrality by 2050**. As part of the European Green Plan, the Commission proposed in September 2020 to increase the greenhouse gas emissions reduction target for 2030, including emissions and detonations/removals, by at least 55 % compared to 1990. In addition, among others, it is envisaged to extend the application of the trading system to maritime transport emissions, as well as the implementation of a system to regulateand reduce CO2 emissions forinternational transport.

  A new autonomous emissions trading system is created for buildings, road transport and fuels for additional sectors. This includes raising theoverall ambition to reduce emissions by 2030 in the sectors covered by2 the EU ETS to 62 %.
  The Effort Sharing Regulation sets bindingannual greenhouse gas emission targets for

Emissions Trading2 Scheme

Member States in sectors not covered by the EU Emissions Trading System (EU ETS) or the Land Use, Land Use Change and Forestry (LULUCF) Regulation, such as road and inland maritime transport, buildings, agriculture, waste and small industries.

- **The Land Use, Land Use Change and Forestry (LULUCF) Regulation establishes a binding commitment for the EU to reduce emissions and increase removals in the land use, land use change and forestry sectors**. The new rules set an increased EU-wide target forclean greenhouse gas removals of at least 310 million $CO2_{equivalent}$ by 2030.
- RES**penetration: The**indicator for Renewable Energy Sources (RES) as anamount of gross final energy consumption in 2030 will be at least42.5 % (which can be increased to 45 %), accompanied by sub-targets per consumption sector (electricity, heating/cooling andtransition).
- **Energy efficiency in 2030 of -11.7**%, measured as a percentage change in final energy consumption compared to the forecast for 2030of the 2020 Reference Scenario.
- **Blending of biofuels** (advanced and above in conventional) and renewable gases of non-biological origin as% in transport fuels.

In addition, the following shall be taken into account:

- The**Social Climate Fund**, which aims to address the social anddistributional impacts of the new emissions trading system for buildings and road transport. On the basis of Social Climate Plans to be prepared by the Member States, the Fund aims to move towards strongermeasures and investments for the benefit of vulnerable, very small-households, transport users.
- The national emission reduction commitments set out in Directive (EU) 2016/2284 (NECD), transposed into national law by Joint Ministerial Decision No ΥΠΕΝ/ΔΝΕΠ/67467/3577 (Government Gazette, Series II, No 4740/B/23.10.2018), for the years from 2020 to 2029 and from 2030 onwards for the pollutants sulphur dioxide (SO_2), nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), ammonia(NH_3) and $PM_{2,5}$ particulate matter.

In order to comply with the above national commitments, the National Air Pollution Control Programme (NAPCP) (Joint Ministerial Decision No Υ-ΠΕΝ/ΔΚΑΠΑ/5615/121/2021, Government Gazette, Series II, No 812) has been established.

The NAPCP contains national policies and measures to comply with national emission reduction commitments. It is based mainly on the measures and policies contained in the institutionalised National Energy and Climate Plan (NECP), but also on measures and policies relating to the agricultural sector,waste management and transport.

The NAPCP in accordance with an obligation under the above legislation is due to be updated in early 2025.

Most importantly, following the European Climate Law 2021/1119 establishing a framework toachieve climate neutrality, Greece adopted for the first time National Climate Law 4936/2022 (Government Gazette, Series I, No 105), which sets specific targets, including reducing greenhouse gas emissions by 55 % by 2030 and 80 % by 2040 (compared to 1990 levels), and achievingclimate neutrality (i.e. zero total greenhouse gas emissions) by 2050. Therefore, the current National Energy and Climate Plan incorporates the objectives of the National Climate Law, the objectives of the European Union policy (RE-PowerEU and Fit-for-55 under the Green Deal) and the European directives on renewable energy sources, energy efficiency andothers, which are being finalised.

1.5 Overview of country objectives

Key objectives for the preliminary draft revision of the NECP for 2030

	Objective 2030		
	NECP 2019	Revision of the NECP	2021
GHG emissions reduction (without LULUCF); % reduction vs 1990	**— 40 %**	**— 54 %**	**— 26 %**
Renewables adoption; % of gross final energy consumption	**35 %**	**44 %**	**22 %**
Gross final energy consumption; mtoe	**16.5**	**15-4**	**15-65**

Table 1 Summary of draft NECP objectives for 2030

The government supports in its long-term strategic path towards a climate-neutral economy with a view to improving the competitiveness of theeconomy and damping up, creating new jobs, strengthening its role inthe functioning of competitive energy markets for the benefit of thecommunities.

Table 1 summarises the revised and more ambitious national yards,both in relation to the targets set in the original NECP and in relation to the actual 2021 figures.

The priority of the NECP in terms of planned policies and implementation of specificmeasures is also to achieve specific objectives in terms of security of energy supply, the functioning of energy markets and the roleof fraudsters, to strengthen the competitiveness of the economy and to promoteresearch and innovation actions.

A key parameter for achieving the objectives set in the NECP is the understanding that the trajectory of individual sectors automatically influences the trajectory of the othersand therefore the measures finally planned and implemented do not have unambiguous impacts that concern/refer only to a thematic dimension and unit of the NECP, but rather co-shape the overall evolution of the energy system and show that the NECP is directly related to other national policies such as waste management, circular economy and climate adaptation.

Chapter 3 presents the Policy Priorities and Policy Measures selected in order to achieve the ambitious objectives set in a consistent and effective manner. The preparation of policy priorities and measures was carried out by applying the process illustrated in Figure 1.

Figure 1 Methodology for the design of NECP policies and measures in 2021-2030

In particular, specific policy priorities have been identified in order to achieve the National Objectives, which need to be fulfilled in the period 2021-2030 through the development of targeted policies and measures.

At the same time, there is also a procedure for assessingthe performance and assessment of policy responses in order to provide feedback onthe policy priorities and their possible revision and redefinition in order to achieve the objectives set.

The aim is therefore to achieve these policy priorities more efficiently, which can be achieved by designing and implementing policy measures for each priority individually.

Priorities and policies are set for both the five dimensions of the Energy Union and separately for Renewable Energy Sources:

- **Climate Change, Emissions and removals of greenhouse gases,**

- **Renewable energy sources;**
- **Improving energy efficiency;**

- **Security of energy supply**
- **Energy market**
- **Research, innovation and competitiveness**

This draft revised NECP puts more emphasis on the first 5 dimensions. The necessary revision of priorities and policies for the research, innovation and competitiveness dimension is under design and will be present inthe next phase of the presentation of the revised NECP.

1.5.1 The green energy transition

The targets set in the NECP are quantified and costed, and intermediate milestones have been set, allowing for a paralysis ofthe path towards achieving the targets and related to successful adoption and triggeringa mix of policies and measures.

The NECP highlights the country's priorities and development potential in energy and tackling climate change and aims to make it the *main tool* ***for shaping national energy and climate policy over the next decade***, taking into account the recommendations of the European Commission and the UN Sustainable Development Goals.

The strategic objective is that the energy and climate targets set in the revised NECP by 2030, 2040 and 2050 are achieved in the mostenvironmentally competitive way and provide an opportunity for growth benefits forthe economy. Finally, the aim is to make the country one of the Member States that will have adopted ambitious climate and energy targets, througha comprehensive and coherent programme of measures and policies, while attracting investment in clean technologies, infrastructure and innovation.

This transition will go hand in hand with strengthening the competitiveness of Greek businesses and protecting consumers, establishing a framework for the sustainable development of the national economy, making best useof national and European financial mechanisms and adopting appropriate mechanismsin accordance with EU legislation.

The green energy transition envisaged in the NECP will be the resultof difficulties in all sectors, including significant investments by citizens in their homes and the purchase of durable advanced goods. The NECP sets the objective of not depriving any household, including vulnerable financial ones, of the possibility of energy upgrading the home and the acquisition of efficientelectric appliances and vehicles. To this end, the proposed measures havea strong focus on tackling energy poverty/poverty and relyingon funding and subsidies, as a priority for households withreduced funding possibilities, to ensure that no social group falls behind in the green technological modernisation of buildings, appliances and vehicles.

The dramatic technological progress already achieved for RES and energy-efficient technologies, such as lighting, building materials, heat pumps and electricvehicles, is accompanied by a steady reduction in the cost of purchasing and using them, thereby reducing the cost of their energy needs. The draft revised NECP aims to achieve commensurate progress and cost reduction also for the technologies that will be needed and are currently under-development, such as energy storage, hydrogen and green synthetic fuels. The dynamic path of the green energy transition, asset out in the NECP, is designed to ensure a steady reductionin energy and energy services so that the mix of technologies is based on affordable technologies and gradually integrate into the mix and new technologies, the costs of which are expected to decrease in the future. In eachcase, the development and implementation of individual measures and policies will be monitored in order not to create technological lock-in and make use of either otherArts or other combination of measures to achieve the central objectives.

The successful green energy transition depends to a large extent on the development, reinforcement and optimal operation of the necessary energy infrastructure, suchas electricity grids, smart systems for infrastructure management, pipelines, storage facilities and charging and charging stations for alternative fuels. These investments, which will be carried out under the responsibility of the infrastructure managers, are under the supervision and regulatory control of the State. The NECP includes infrastructure development targets and investment facilitation measures.

The green energy transition substitutes fossil fuels for which, in addition tolignite, is subject to import dependency, with indigenous RES based energy sources and improved energy efficiency. The green energy transition therefore bringssignificant strategic benefits for the country, in addition to reducing greenhouse gas (GHG) emissions to prevent climate change, which are summarisedas follows:

- Avoiding energy price crises caused by international geopolitical eventsand the international energy market, such as oil crises and the recent gas price crisis. Energy prices in the long term will be more stable and predictable, reflecting the cost of recovering capital in investments.
- Extensive reduction of energy dependency on importedenergy products such as oil and gas. Security of energy supply will depend on the technical reliability and adequacy of indigenous energy systems, which are predictable and technically manageable, and

lessdependent on geopolitical factors. New spin-off will be dependent onraw materials and critical ores, but this is also considered manageable.

- Strengthening the competitiveness of the national economy and the resilience of economic sectors to external factors
- Phasing out fossil fuel combustion simultaneously brings abouta reduction in emissions responsible for air pollution, such as sulphur dioxide, nitrogen oxide, particulate matter and others. Air quality in cities and other affected areas will improveTHEAMA. At the same time, noise pollution will be reduced thanks to electrictraffic.

In conclusion, the green energy transition, inaddition to preventing climate change through climate change mitigation, will make a significant contribution to achieving the objectivesof energy independence, costs and stability of energy prices, the competitiveness of the national economy, as wellas limiting air pollution, especially within urban centres.

1.6 consultations and stakeholder participation

1.6.1 Governance structure

The revision and update of the National Energy and Climate Plan (NECP) in Greece is based on a comprehensive and comprehensive governance structure. More specifically, the '**Interministerial Committee on Energy and Climate**' is the main body for updating the NECP (established by Ministerial Act 31/2019). The Commission wasalso active during the preparation of the initial NECP and the structure of the measure waslaid down in Ministerial Act No 31/2019 – Issue A' 147/30.09.2019 and Ministerial Decision ΥΠΕΝ/ΔΕΠΕΑ/51149/386/09.05.2023 – Government Gazette, Series II, No 3296/2023). The InterministerialCommittee shall have the following powers:

- Formulation of national priorities, methodology and guidelines for the country's energy planning, as well as for the preparation of the NECP.
- Drafting, presenting and submitting the final draft NECP to the Minister for the- Environment and Energy.
- Support the Minister for the Environment and Energy in discussions with the competent committees of the Hellenic Parliament and the European Commission.
- Analysis and updating of energy scenarios.
- Proposals for energy and climate measures and policies.
- Guidance to institutional actors.
- Facilitate coordination and consultation at national and regionallevel.

In particular, the Commission prepares and submits the final draft of the NECP to the Minister for the Environment and Energy. The NECP is ratified by decision of the Government Economic-Policy Council, following a recommendation from the Minister for the Environment and Energy.

The Ministry of the Environment and Energy has also set up **working groups to monitor the objectives of the National Energy and Climate Plan**, which is divided into three technical groups: (I) Project Management and Management Team, (ii) Technical Analysis and Data Group and (iii) Composition and Finalisation Team. The NECP Monitoring Working Group, with its technical groups, has the following roles (Ministerial Decision ΥΠΕΝ/Νο ΠΕΑ/51149/386/09.05.2023 – Government Gazette, Series II, No 3296/2023):

• Project**Administration and Management Team**: it shall coordinate the work of all parties involved, the Interministerial Committee, the Working Group, the supervisedorganisations and bodies and, where appropriate, third parties, manage its work to oversee theNECP. It shall coordinate the process of monitoring its implementation and partlyto ensure compatibility between the NECP and other national strategies, policies and measures related to energy and climate:

• **Technical Analysis and Data Team**: it takes care of the primary material forthe reconsideration of the NECP, which is prepared by the involved and institutionally competent bodies and/or external consultants (studies, graphs, verbal, etc.), checks its technicalintegrity, in accordance with the findings of art and science, and monitors the technical implementation of the measures of the revised NECP.

• **Composition and Finalisation Team**: it composes the primary material in a single Plan A, approved NECP, checks and approves the final submission of the Plan to the Interministerial Committee for adoption. Once the revised NECP has been finalised, the local authority shall ensure that the policies and measures described in the NECP are implemented and that the progress reports are drawn up.

In addition, in accordance with the National Climate Law 4936/2022 (Article 29), **a Scientific Committee on Climate Change (EKA**) is established at the Ministry of the Environment and Energy, consisting of the President and eight (8) members, of a renowned and highly qualified scientific qualification with academic or professional specialisation in the field of climate change, environmental protection or related scientific fields.

The **ESC** shall be responsible, inter alia, for:

(a) proposing policies to address climate change and their combination with climate change adaptation measures.

(b) the scientific evidence of the necessity of the proposed policies.

(c) the opinion on any matter relating to tackling climate change, referred to it by the Minister for the Environment and Energy, the Ministerfor Climate Crisis and Civil Protection, the Secretary-General for Natural Environment and Water, the Government Commission on Climate Neutrality or the National Council for Adaptation to Climate Change.

(D) working with other scientific committees to promote solutions to climate change that take into account the need to preserve biodiversity and the integrity of natural ecosystems.

(e) to coordinate an annual consultation with stakeholders, representativesof productive bodies and civil society on climate policy issues and to integrateits results into the annual progress report, prior to its submission to the Governmental Commission on Climate Neutrality.

submitting to the Government Commission for Climate Neutrality proposals on the need for a possible adaptation of climate policy.

(g) to give an opinion to the Government Commission on Climate Neutrality every five (5) years on the five-year carbon budgets in all sectors of the household

, on the need or not to update the long-term and intermediatekey objectives, actions and methods for achieving them, in accordance with relevant national and EU legislation and international agreements.

Finally, the EKA cooperates with the Interministerial Committee on Energy and Climate, the Directorate for Climate Change and Air Quality of the Ministry of theEnvironment and Energy and the competent body of the Ministry of Climate Crisis and Civil Protection. The administrative and technical support of the Scientific Panel on ClimateChange is provided by the Secretariat-General for Natural Environment and Water.

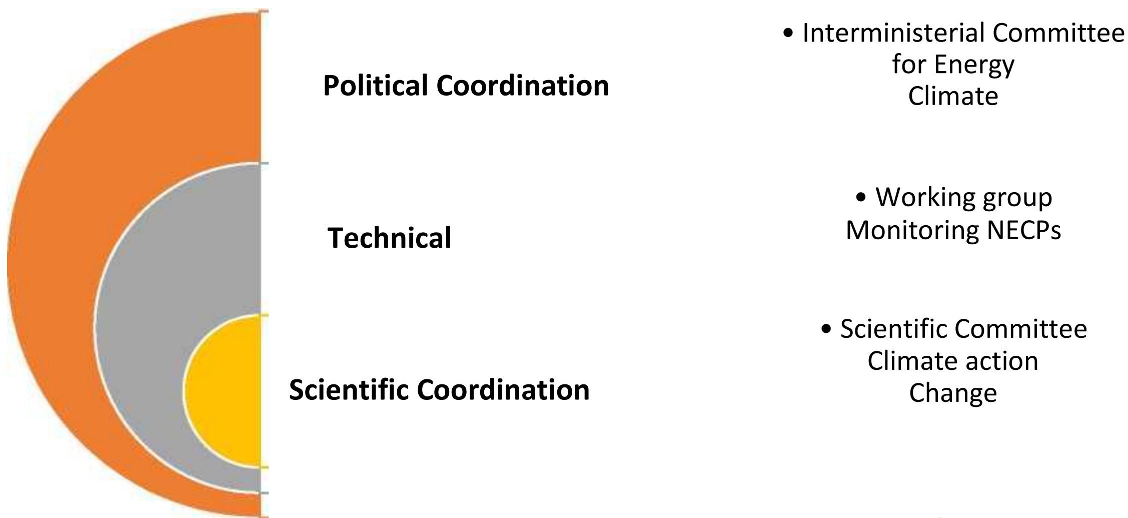


Figure 2 Overview of the governance structure

1.6.2 Involvement of national bodies

Consultations with stakeholders and civil society are an essential process that takes place throughout the preparation of the revised National Energy and Climate Plan (NECP).

1. On 18 January 2023, a detailed presentation of the draft updated NECP and its quantitative targets3 was made to all members of the Interministerial Committee on Energy and Climate as well as to additional bodies participating, upon invitation, in the Interministerial Committee. The aim was to present the proposal to update the NECP, with a detailed reference to the 2030 energy and climate policy objectives, the evolution of baselines in the energy balance by sector, and the amount of investment needed to achieve the targets. At the same time, the presentation was published in all the media, thus initiating a wider public disclosure and consultation of the proposals forfine-tuning the NECP.

II. Stakeholders invited to the NECP Interministerial Committee set out proposals for the proposed policy objectives and priorities and recommendations for planned measures and policies to achieve these objectives betweenJanuary and February 2023. In particular, five (5) bodies submitted comments, including the Bank of Greece, the HellenicHydrocarbon and Energy Resource Management Company (EDEYEP), the NationalGas System Operator (DESFA), the Centre for Renewable Energy Sources (CRES), and representatives of non-governmental organisations such as Greenpeace and WWF.

III. A presentation of the draft NECP update to the members ofthe Scientific Committee on Energy and Climate (SCC) took place on 4 April 2023. The purpose of the presentation was to inform and advise the Commission on the draft update of the NECP.

IV. In the period August – September 2023, the MEE conducted a closed preliminary process for the draft updated NECP with specific national bodies and stakeholders. In particular, the draft updated NECP (which emerged taking into account comments from the bodies during the first phase of consultation) was sent back to the stakeholders, accompanied by a questionnaire developed

3 https://ypen.gov.gr/kostas-skrekas-me-to-neo-proteinomeno-esek-dinoume-yperaxia-stin-elliniki-oikonomia-dimiourgoume-nees-theseis-apascholis-kai-epitygchanoume-antagonistikes-times-energeias/

by the Ministry of the Environment and Energy in order to facilitate the construction and collection of the replies/comments. The purpose of the questionnaire was firstly to assess qualitatively the degree of agreement or disagreement of the bodies involved with the direction of the NECP and, secondly, to prioritise the comments/comments of thebeans, based on the frequency of their occurrence, **so that they could be taken into account in the final updated NECP to be submitted in June 2024**. At this stage, a total of 36 stakeholders submitted replies and comments, while60 entities had been requested (60 % response rate). The bodies that provided comments includeministries and public authorities, businesses and industry associations, electricity and gas networkoperators, members of the EKA, non-governmental organisations and other bodies involved.

The figure below summarises the degree of agreement with the direction of the NECP per type of body involved.

Figure 3 Overview of the preliminary draft consultation by the Interministerial Committee

This draft is the draft of the revision of the NECP. Following the value ofthe European Commission and before the finalisation of the revised NECP, which will be submitted by 30 June 2024, the final draft revision of the NECP will be published in an open public consultation with civil society, with a view to sending comments and views that will contribute to the finalisation of thedelegated NECP.

1.6.3 Consultations with other States

During the process of drafting the NECP, account was taken of active/existing and ongoing regional cooperation on energy and climate issues, in order toassess any synergies and specific actions that may contribute to the achievement of the national energy, environmental and other objectives of the NECP.

The following relevant information can be found in this context:

I. Regional Cooperation: General information sources

Greece systematically pursues the objective of becoming the main energy hub of thevast outermost region, diversifying its own and the region's security of gas and electricity supply. Regional Energy Cooperation is of paramount importance both for energy security and for the resilience of energy systems in order to effectively tackleenergy crises.

In particular in the energy sector, important regional cooperation schemes for the implementation of Greek policy are:

1. Energy Community: the Energy Community process is undergoingthe expansion of the European internal energy market in South-EasternEurope. Greece participates in the bodies of the Energy Community with the status of 'participating country' with the right to speak but not to vote, as it is covered by the EU Common Position.

2. Energy Interconnection Central and South-Eastern Europe (CESEC): the 'Central and South-Eastern Europe Energy Interconnection' (CESEC) prototype aims to accelerate the integration of the gas and electricity markets.

Since 2017, cooperation has been extended to renewable energy andenergy efficiency and, since 2020, to energy transition.

3. Energy Chart: The Energy Charter Treaty is a legally binding multilateral agreement covering the promotion and protectionof investment, trade, transit, energy efficiency and dispute resolution. It was signed, together with the Protocol to the Energy Charter on Energy Efficiency and Related Environmental Issues, in Lisbon in December 1994 and entered into force in law in April 1998**.**

4. Transatlantic Cooperative for Energy and Climate Cooperation (P-TECC): The International

Affairs Bureau of the US Department of Energy coordinatesthe Transatlantic Energy and Climate Cooperation (P-TECC), an international platform designed to provide policy makers andcivil society leaders in Eastern and Central Europe with the resources and technical tools to create a secure, resilient and climate-friendly energy system. The primary objective of P-TECC is to support European energy security efforts, including the European Union Energy Union framework and the Three Seas Initiative.

5. EU**Strategy for the Adriatic-Ionian Region (EUSAIR): The main**objective of the EUSAIR is to promote economic growth and prosperity in the Adriatic-Ionian region by improving its attractiveness, competitiveness and connectivity.

6. The**East Mediterranean Gas Forum (EMGF**): On 22 September 2020 in Cairo, Cyprus, Egypt, Greece, France, Israel, Italy, Jordan and PoaLeistine signed the Statute establishing the East Way Gas Forum(EMGF). The signature of the EMGF recognises that significant offshore gas-withdrawals in the Eastern Mediterranean will have a significant impact on the enduringand economic development of the region and stability and economic development should be promoted through the development of synergies. The Statutes were ratified by Greece by Law 4769/2021.

7. Organisation for Black Sea Economic Cooperation (BSEC): Thecurrentfight against cooperation within the BSEC Agency focuses on strengthening PraSince Development in the Black Sea region, as BSEC countries are now more oriented towards increasing the use of RES and tackling climate change by reducing emissions, which are a global challenge.

8. Union for the Mediterranean (UfM): The Union for the Mediterranean acts as a unique-platform to facilitate and promote regional dialogue and cooperation, as well as concrete projects and initiatives in the fields of Energy and theWest for Climate, in order to address the challenges of energy and the chain ofchange in the region, while supporting more secure and sustainable energydrills.

9. International Renewable Energy Agency (IRENA): IRENA was formally established in Bonn on 26 January 2009. At the founding conference, seventy-five (75) countries from all over the world, including Greece, signed its Statute, which has been ratified by the Greek Parliament by Law 4017/2011. The Agency currently consists of 168 Member States (IRENA is also a member of the EuropeanUnion). The central objective of IRENA is to rapidly spread the use of Renewable Energy Sources (RES) worldwide.

II. Tripartite and Multilateral Cooperation Projects:

1. Greece-Cyprus – Jordan

On 16 January 2018, a Memorandum of Understanding was signed in Nicosia between the-Ministry of Environment and Energy of the Hellenic Republic, the Ministry of Energy, Commerce, Industry and Tourism of the Republic of Cyprusand the Ministry of Energy and Mineral Resources of the Hashemite King of Jordan for RES Cooperation. The purpose of cooperation based on the signed Memorandum of Understanding shall be the exchange of information and know-how, policy development, education and actions on RES, energy efficiency, innovation and research, as well as the exchangeof knowledge, best practices and pilot projects in buildings, with a particular focus on the promotion of nearly zero-energy-buildings and the integration of RES systems and technologies. Since 2018, 3 Summits have taken place between the three countries and cooperation focuses mainly on RES and energy efficiency, according to the relevant Declarations.

2. Greece-Kypro-Israel-Italy

A Memorandum of Understanding was signed in Nicosia on 5 December 2017 betweenthe Government of the State of Israel, the Government of the Republic of Cyprus, the Government of the Hellenic Republic and the Government of the Italian Republicconcerning work on the EastMed gas pipeline.

The purpose of this Memorandum of Understanding is to confirm the intention of theparties involved to cooperate in order to enable the development and implementation of the EastMed pipeline as a viable and strategic choice for gas producing states, to ensure a direct and long-termgas export route to Greece, Italy and other European markets, and to enhance the security of the EU's energy supply, while promoting competitionbetween gas suppliers.

The Intergovernmental Agreement on the EastMed pipeline project was signed on 2 January – 2020 by Greece, Cyprus and Israel. However, the Italian Government has not signed the agreement to date.

3. Greece-Cyprus – Israel

A Joint Declaration between Greece, Cyprus and Israel was signed in Israel on 20 December 2018[at] the 5th Summit, which, inter alia, focusedon the completion of the Intergovernmental Cooperation on the EastMed Gas Pipeline. In particular, reference was made to the commitment of all three sides to the implementation of the EastMed pipeline and to the signature of the relevant Intergovernmental Agreement, support for the Euro-Asia Interconnector electricity interconnector project, as well as the extension of their cooperation in the field of RES, alternative fuels, electricvehicles, the enhancement of innovation and the implementation of joint pilot projects. Following the decision to implement Crete's electricity interconnection as a national project (Ariadne Interconnection), with a view to ensuring the timely energy adequacy of Crete, Greece supports the implementation of the Crete – Cyprus – Israel electricity interconnection project. The Memorandum of Understanding on the "EuroAsia Interconnection Project" waspresented on 8 March 2021.

4. Greece-Cyprus – Egypt

The Joint Declaration of the 9th Tripartite Summit between Greece, Cyprus and Egypt (19.10.2021) explicitly mentioned once again the intention of the three countries to continue their cooperation through a series of agreements on the exploitation and transport ofgas, as the discovery of deposits in the region can act as a catalyst for regional stability and prosperity.

In addition to the above tripartite cooperation in the gas sector, the three countries cooperate both through joint exploitation of deposits and their participation in the EMGF.

For the cross-border interconnection of electricity transmission networks between Greece, Cyprus and Egypt, a Memorandum of Understanding has been signed between the competent departmentsof the three countries at the 9th Summit on 19 October 2021, which sets out a general framework for cooperation to implement the planning, licensing, development and implementation of the cross-border interconnection project.

III. Bilateral Cooperation

1. Greece – Israel

Energy relations with Israel have been institutionally strengthened by the signing of Joint-Declarations between the two countries. On 8 August 2013, the 1th joint Greece-Israel Declaration on Energy Cooperation was signed in Nicosia. Continuing to promote cooperation at bilateral level is implemented through the holdingof superior Cooperation Councils (CCCs). The last SSC between the two countries tookplace in Thessaloniki on 15 June 2017, at the end of which a Joint Declarationdescribing the content of bilateral cooperation was signed. This includes promoting energy security to adequately meet the growing demand for energy resourcesin the region, increasing energy supply to enhance economic growth and prosperity, optimising the management of energy resources for the uninterrupted supply of energy goods in a sustainable way, protecting theenvironment and reducing the impact of climate change.

In July 2023, the Greek side proposed a Memorandum of Understanding on bilateral cooperation in the fieldof land, which is currently under negotiation.

2. Greece-Egypt

Enhanced cooperation between the two countries was blocked by the signing of two Electricity Interconnection and Gas Interconnection Memorandum. More specifically, the “Greece-Egypt Electricity Interconnection Project” (signed on 14 October 2021) includes onshore/offshore infrastructure, including electric submarinecables, providing a direct connection for the two-way transmission of electricity between the Hellenic Republic and the Arab Republic of Egypt and the rest of the interconnected market of the European Union. This project aims to build strong interconnected grids across the Eastern Mediterranean, in order to enhance the security and reliability of energy supplies, to promote regional cooperation, peace and prosperity, to enhance the further development and penetration of electricity produced from nano energysources in national, regional and European electricity mixes, building on the surplus of electricity that has been or will be furthermaintained in the future. In addition, the Memorandum of Understanding on “Gas Interconnection” (signed on 25 November 2021) by the two countries aims to establish a general framework promoting cooperation in thegas sector (industry) including, inter alia, the enhancement of LNG trading, the establishment of a two-way gas interconnector and cooperation in the field of gas research.

3. Greece – Saudi Arabia

In 2022, the Greece-Saudi Business Forum (30 May 2022) andthe 5th Joint Interministerial Committee (31 May 2022) took place inA. These events gave concrete impetus to further strengthen thework of the two countries in important sectors such as tourism, energy,new, investment, construction and the agri-food industry.

The partnership of the two countries has developed intensively in recent years and the need to consolidate and build on this work for the mutual benefit of their respective groupshas led to the signature between the Government of the Hellenic Republic and the Government of the Kingdom of Saudi Arabia of a Memorandum of Understanding (26 July 2022) on their cooperation in the field of energy. This Memorandum reflects their desire to strengthen their cooperation in various energy sectors such as oil, gas, electricity, renewable energy, energy efficiency, petrochemicals, as well as the circular carbon economy and itsconcepts, in order to reduce the causes and impacts of climate change.

4. Greece – United Arab Emirates

Cooperation between the two countries in the field of energy and climate change isachieved by signing three Memoranda of Understanding as follows:

Initially, a “Memorandum of Understanding on Energy Cooperation” was signed betweenthe two countries on 4 May 2017 at the 3th session of the Joint Inter-MinisterialCooperation Committee between the Hellenic Republic and the United Arab Emirates, held in Athens on 3-4 May 2017.

Subsequently, a “Memorandum of Understanding on Climate Action” was signed on 9 May 2022. The aim of this Memorandum of Understanding is to lay the foundationsfor bilateral cooperation on climate action and to strengthen bilateral cooperation on climate action and provides the framework within which concrete cooperation projects and initiatives can be proposed and implemented by participants.

Finally, Abu Dhabi Future Energy Company PJSC- Masdar and the Government of the Hellenic Republic signed a ‘Memorandum of Understanding on the GR-eco Islands Initiative’ on 9 May 2022. The aim of this Memorandum of Understanding is to create a toolto facilitate and strengthen bilateral cooperation on the GR-eco Islands Initiative – a strategic government initiative by the Hellenic Republic in the fight against climate change aimed at transforming the Greek islandsinto green, sustainable and digital growth through a fair and socially inclusive energy transition.

5. Greece-North Macedonia

Cooperation between the two countries in the field of energy is implemented by thesigning of an Addendum on the Development of the Gas Interconnection between Greece andNorthern Macedonia signed on 9 July 2021. The main objective of the Agreement isto provide support for the project to interconnect the gas systems of the two countries to be carried out by their competent gas companies and to ensurethat each company will construct, in coordination but independently of the other, the part of the project on their respective national territory.

6. Greece – Bulgaria

In the field of gas storage, a ‘Memorandum of Understanding on natural gas security’ was signed on 16 February 2023 between Greece andVoul. The aim of the Memorandum is, inter alia, to facilitate the possibility for Greek companies to store gas in the Bulgarian facilities in Chiren, ensuring similar access to Bulgarian companies in Revythoussa. This agreement increases the resilience of their domestic security system forboth countries, while consolidating their energy solidarity andwork.

For cooperation in the field of crude oil Greece and Bulgaria, they have decided to jointly explore the possibility of constructing acrude oil pipeline for non-Russian oil connecting the port of Alexandroupoli in theHellenic Republic and the Burgas region of the Republic of Bulgaria (Alexandroupoles-Burgas project). For this reason, the two countries signed a 'Memorandum of Understanding on the Construction of the Alexandroupol-Burgas oil pipeline' on 16 February 2023. A similar Memorandum of Understanding, onthe synergy of the two countries in the field of energy, was proposed in October 2023by and is under negotiation.

7. Greece – Germany:

Cooperation between the two countries is implemented by the Greek-German bilateral action plan which held its 5th meeting in Berlin on 12 May 2022. In the Action Plan, both sides decided to reduce their dependence on Russian energy supplies, in particular gas, as soon as possible, in line with EU short-term measures such as diversification of supply, higher LNG imports and storage obligations. As the diversification of fossil energy imports can only be an intermediate step, the common long-termgoal is an energy efficient, fossil-free, climate-neutral and renewables-based energy system as part of their 2050 energy and climate strategy. Under the projects TARES4 (Technical support for clean energy investments in Greece), TARES5 (Technicalsupport for clean electricity in Greece), TARES6 (Technical support for the implementation of clean energy investments under the Greek Bypassand Resilience Plan) and H_2Greece (Technical support for the implementation of Greece's National HydrogenStrategy), supported by the Directorate-General for Reform(DG-Reform), cooperation in the field of renewable energy, energy efficiency and electro-mobility in Greece has been stepped up, in particular at the level ofthe national recovery and resilience plans. Both sides commit to further cooperation on innovative technologies and knowledge sharing in the field of integration of RES and green hydrogen systems, as partof the DEU-GRC Clean Energy Strategy.

8. Greece-Italy

On the cooperation of the two countries in the field of energy, a joint declaration was signed in Corfu on 14 September 2017 by and between the Minister for the Environment and Energy of the Hellenic Republic and the Minister for Economic Development of the Italian Republic, inthe framework of the first bilateral meeting between Greece and Italy.

Following the above Joint Declaration, a MINE of singleunderstanding was signed in Rome on 26 November 2019 between the competent ministries to enhance energyefficiency between the two countries.

Finally, on 9 September 2022, the Ministry of Environment and Energy of the Hellenic Republic and the Ministry of Ecological Transition of the Italian Republicsigned a “Memorandum of Understanding on Security of Gas Supply and Storage”. TheMemorandum of Understanding is to create a framework for strengthening cooperation between the Parties to ensure that the storage capacity of bo isreserved to underground storage facilities (UGS) located in the territoryof the Italian Republic.

9. Greece-USA

Greece and the United States of America have been working closely together through Strategic Dialogues since 2018. In the context of the 4th Strategic Dialogue between the two countries held in Athens on 21 February 2023, the main themes of cooperation in the field of energy were Regional Energy Cooperation and Resilience and the Energy Transition. In addition, cooperation between the two countries is strengthened to achieve energy security and regional stability, through multilateral cooperation schemes such as the Greece-Kyproy-Israel and the US (3 + 1) and the Eastern Mediterranean Gas Forum (see above), where the US has an observer role. Finally, the signing of a bilateralMemorandum of Understanding between Greece and the USA (USAID) for energy cooperation in the Western Balkans is about to be signed (13/11, Athens).

Other collaborations

- Participation in the CA-EED, CA-EPBD, CA-RES groups on RES and energy efficiency.
- Participation in ENTSO-e meetings on energy market anddevelopment issues.
- Participation/cooperation as the National Centre for RES and EEE in the European Network of Energy Centres (ENR) and the Mediterranean Network of Energy Centres (MEDENER).

Specific cooperation on Innovation Research and Competitiveness

In the context of the long-standing cooperation and bilateral scientificand technological (S) cooperation agreements in force with other countries, the Secretariat-General for Research and Technology (GSRT) is launching joint calls for research and technology programmes. The calls announced concern the submission of proposals for the implementation of bilateral R & Dprojects in the field of energy. The proposals submitted concern areas ofmutual energy interest developed through consultations with the competent bodies of the cooperating countries and are compatible with the strategicareas of Research, Technological Development and Innovation (RTDI) and the thematic prioritiesset out in the National Smart Specialisation Strategy (RIS3) 2014-2020.

2.1 Summary of objectives set by the NECP

The Greek government intends to use the NECP as the maintool for national energy and climate policy for the next decade, taking into account the recommendations of the European Commission and the UN SustainableDevelopment Goals.

The NECP highlights the priorities and development potential that Greecehas in terms of energy and tackling climate change, and provides for a specific roadmap for achieving specific targets and targets, outlining policy priorities and measures, across a wide range of development and economic activities for the benefit of society.

The main objective of the National Energy and Climate Plan is to design, plan and implement the most socially, environmentally and economically efficient policymeasures that will contribute to the achievement of thenational energy and climate objectives in the medium to maturity, contribute to the economicdevelopment of the country, while at the same time meeting the challenge of reducing energy costs and protecting final consumers from high prices of energy products and services in general. The national energy and climate reservesfor 2030 are determined taking into account the specific quantitativecharges undertaken by Greece as a Member State, the characteristics and specificitiesof our national energy system, the domestic potential for the development of technologies and applications, the adaptability and the socio-economic and legal characteristics of Greece. Through this process, national targets are adjusted on the basis of corresponding central European targets (i.e. targets for sectors included in the Emission Trading System, RES and Energy Efficiency) and finally proposed in the context of this national plan.

In addition, in the context of the National Energy Plan, the key quantitative policy objectives set for the period up to 2030 are at the same time ‘consistent’ targets for reducing greenhouse gas emissions by 2050, where the Greek Government’s objective is to participate in the commitment to a climate-neutral economy at EU level.

The green energy transition aims to make the country’senergy system climate-neutral, i.e. close to zero carbon dioxide emissions from the combustion of fossil fuels and climate neutral processes that emit non-energy greenhouse gases. The objective is that net sinksof positive and negative GHG emissions by taking into account the additional carbon removal from soil, forests and the sea should be equal to zero in 2050 and thus continue to perpetuate.

Thetrajectory towards this goal starts with the 2030 milestone for which EU legislation provides for a broad set of targets across all energy sectors in order to drastically reduce GHG emissions. The sectoral targets for 2030, as well as the regulations on specifications, infrastructures and technologies, aim to guideall sectors in the choice of appropriate investments and changes,let me continue the ambitious emission reduction trajectory to continue and accelerate over the period from 2030 to 2050. An intermediate milestone is the year 2040 for which the national climate law provides for a specific emission reduction target and for which EU legislation has not yet reached.

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	2025	2030	2035	2040	2045	2050
GHG,LULUCF (change since 1990)	— 26 %	— 40 %	— 41 %	— 54 %	— 68 %	— 82 %	— 89 %	— 93 %
GHG with LULUCF (change since 1990)			— 44 %	— 57 %	— 72 %	— 87 %	— 95 %	— 99 %
RES indicator as% ofgross final consumption ofenergy	22 %	35 %	31 %	44 %	65 %	83 %	97 %	105 %
Energy efficiency		0 %	— 4 %	— 5 %	— 14 %	— 18 %	— 22 %	— 27 %
Final consumption ofland (million billion)	15.2	16.5	16.6	15.4	13.7	12.7	12.0	11.5
RES-Electroproduction (% gross electricity consumption)	36 %	61 %	58 %	79 %	94 %	96 %	96 %	97 %
RES-heating/cooling	31 %	43 %	36 %	46 %	63 %	80 %	99 %	100 %
RES-transport	4 %	19 %	13 %	29 %	98 %	209 %	381 %	584 %
RFNBO (% fuel transport)	0 %	0 %	0 %	1.00 %	11 %	23 %	31 %	50 %
Advanced biofuels (% transport fuels)	0 %	1.50 %	0 %	2.40 %	10 %	17 %	26 %	32 %
Conventional biofuels (% transport fuels) – upper limit	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %
ESR (% GHG change in non-ETS sectors)	— 32 %	— 40 %	— 36 %	— 46 %	— 61 %	— 76 %	— 84 %	— 87 %

Million tonnes of oil equivalent (E.toe4)

Table 2 Overview of objectives of the revised NECP 2021-2050

In its long-term strategy, the government supports a path towards aclimate-neutral economy with a view to improving the competitiveness of the economy and businesses, creating new jobs, strengthening the role of the tanker andoverall the functioning of competitive energy markets for the benefit of society.

Table 2 summarises the revised and more ambitious national years (as part of the preparation of the draft revised NECP) in relation to the targets set in the initial draft NECP submitted in 2019. In the followingchapters, these objectives are broken down into individual objectives and priorities.

The draft NECP review then integrates and outlines measures for strategic priorities such as:

4 ktoe

1. **Rapid growth of RES:** Development of photovoltaic and wind systems (andthe acceleration of offshore wind development), adding more than 12 GW of existing ones by 2030 and exploiting the country's remaining hydraulic potential. A specific programme to support photovoltaics on roofs, expansion of energy communities and a focus on the development of photovoltaics on industrial and commercial roofs. Strategic importance in the developmentof super-building wind and ensuring the siting and network infrastructure.

2. **Energy storage: The**high RES penetration should go hand in hand with the development of the required storage (mainly battery and off-the-shelf technology) to shift excess RES energy, provisionof balancing flows/flexibility services (e.g. fast capacity growth/reduction services) and system stabilisation, contribution to capacity adequacy and network decongestion services. As a complement, part ofthe further services will also be provided by demand response entities.

3. **Energy efficiency:** Energy upgrading of buildings (acceleration,significant intensity and depth of renovations, facilitation of financing), smartenergy consumption management systems and a change ofinclusiveness to reduce the required energy and/or demand profile. Theseactions can have significant added value and development ofemployment. Specific agreements with the industrial sector to undertake commitments to improve energy efficiency and reduce carbon footprint.

   Specific programme for heat pumps, replacement of appliances,lighting and public sector buildings. Expand the response to energypoverty by supporting the possibility to purchase advanced devices and vehicles.

4. **Electrification of light road transport:** Electrification in light-duty vehicleswith simultaneous deployment of charging infrastructure and systems to interact with the electricity grid. A large part of therequired diving will be directed towards zero-CO_2 emission vehicles and smart-charging infrastructure by roll out, ensuring that power supply can be managed using intelligent systems.

5. **Climate-neutral alternative fuels:** Support the development of domesticbio mechanical production of climate-neutral alternative fuels for transport sectors that are not technically feasible or in an interest to electrify, such as shipping and possibly heavy long-distance road transport.

6. **Gaseous fuel system:** maintaining the gas system in the country and intensifyingin regions or sectors that are not supplied, providedthat the renewable gas mix distributed can quickly become a low carbon footprint.

7. **Bio-economy:** Investments and leverage for the development of a national industrial and agricultural production of advanced biofuels and biogas to betransformed into biomethane and injected into the gas network.

8. **Creating a green hydrogen economy:** The gradual development of infrastructure and production of hydrogen from RES, with priority being given to its use as a clean gaseous fuel, its uptake by industry and the substitution of fossil fuels in aviation, shipping and freight with-heavy vehicles, and for long storage in electricity generation. Significant mobilityis already emerging in this sector, which, in combination with competingRES, can develop a value chain in the country.

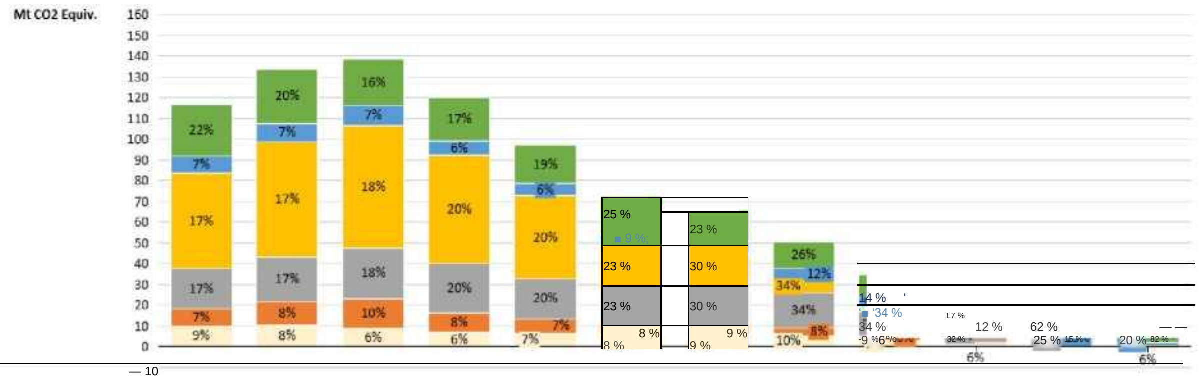
9. **Innovation and systemic solutions in carbon capture and storage** (CCUS) for the energy transition of the country's industry (mainly waterproduction, oil refining, fertiliser manufacturing). Development of investments for capture of CO_2 from industrial processes, its use in the production of synthetic fuels, the future development of climate-neutral CO_2 capture technologies and the development of CO2 geological storage infrastructure.

10. **Supporting new industries and business activities that restarta domestic value chain for green energy technologies with astreet:** Aim to maximise the benefits for domestic growth-and engagement from investments in the green transition and support industries to reduce carbon footprint and energy costs.

2.2 OBJECTIVES AND OBJECTIVES IN THE FIELD OF REMEDIATION

2.2.1 Reduction of greenhouse gas emissions

With a view to mitigating climate change, Greece is fully in line withthe European Union's famine and commitments. In this context, it sets a target of reducing GHG emissions in 2030 to -55 % compared to 1990 emissions. The draft revised NECP foresees that this target for 2030 will be achieved – (~ 54 %) and excluding LULUCF CO2 removals and that the reduction can reach -57 % if a higher contribution from LULUCF is achieved by then. This target is significantly higher than the existing NECP. The NECP 2040 GHG emission reduction target is set at -82 % without LULUCF and can reach -87 % with LULUCF. The corresponding target for 2050 is set, according to the scenario simulated, at -93 % without LULUCF and -99 % with LULUCF, a performance marginally close to the 2050 climate neutrality objective. As will be seenbelow, there are still small emissions in 2050 in some sectors which are difficult to fully eliminate. These emissions need to be compensated through negative emissions (i.e. via GHG storage that reduce thecondensation of carbon dioxide in the atmosphere) and absorption, under the LU-LUCF.



	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Non-CO2 GHGs emissions	25.1	26.1	22.2	21.1	18.5	18	14.8	12.9	11.3	8.7	7.7	7
1 non-energy related CO2 emissions	8.4	9	9.7	6.7	5.8	6.1	5.6	5.7	4.7	2.2	1.9	1.7
Supply side	45.8	55.3	59.2	52.1	40.2	20.9	14.4	6.1	2.3	— 0.1	— 0.5	— 0.8
transport[1]	19.6	21.8	24.4	24	19.2	16.1	19.2	17	11.5	5.9	3.1	0.5
building and agriculture	8.1	11	14.2	9.5	7.0	5.6	5.6	3.7	1.9	1.1	0.1	0.0
Industry	9.8	10.4	8.8	6.7	6.3	5.6	5.8	5.1	2.9	1.1	0.1	0.0
Total[2]	114.7	131.6	138.8	121.1	96.4	71.3	64.1	49.3	34	18.7	12.5	8.5

1. **Excluding** international maritime **emissions**
2. **Including residency C02** emissions

Figure 4 Greenhouse gas emissions (excluding LULUCF) in million tonnes of CO_2equivalent

This presents the GHG emission reduction trajectory in line with the objective of climate neutrality from 2050 onwards.

The**NECP aims as a matter of priority to close to zero** CO_2 **emissions from energy production, already immediately after 2035**, so that unhindered electricity can help reduce emissions in the transport and buildings sectors through electrification. In energy uses where electrification is difficult or asymmetric, electricity with close to zero carbon footprint will produce green hydrogen which will either be used directly or serve to produce synthetic and climate-neutral gases and liquid fuels. Carbon dioxide captured from biomass and pellet steam will be used for thispurpose. This strategy will be fully underway in the immediate aftermath of 2035.

This, as well as through the major energy efficiency improvement envisaged in the NECP, will reduce CO2 emissions tozero in the buildings, industry and transport sectors. It will likely be difficult to completely eliminate emittersin the transport sector, especially in shipping and air transport.

It should be noted that the major reduction in emissions since 2023 is due to the retirement of lignite-fired plants. De-lignification is a deep cut in the national energy map and is also a huge opportunity for the country. The spirit of innovation brought about by lignite exploitation will be passed onto clean energy and the new energy mix of the^{21th} century.

A gradual decarbonisation is foreseen for the transport sector by 2030, mainly due to the penetration of **biofuels and electricity inown transport**. At the same time, there is an increase in RES penetration in this sector compared to the existing NECP, with a target of 29 % for 2030. Electro-mobility contributes to this objective, with an increasing contribution due to the corresponding increase in the share of RES in electricity production, and, secondly, biofuels and renewable fuels of non-biological origin. For the latter, a binding target of 1 % of all transport fuelsin 2030. The plan envisages a significant development of advanced biofuels from suitable biomass feedstocks and in the future mainly from bio ligno-cellulosicmass. In the long term, it will be possible for one third of the fuel needs to come from advanced biofuels and at least 50 % to come from climate-neutral synthetic fuels.

The reduction of CO_2 emissions from industrial processes, where 2/3 are due to the production of building materials, is facilitated in the medium term bythe capture of the released CO_2, its use for the production of synthetic fuels (by 2040) andgeological storage. However, the complete elimination of emissions by2050 seems difficult and needs to be further processed.

It is more difficult to reduce for non-CO_2 GHG emissions, which are mainly methane from the livestock sector. This requires further reflectionon technologies and possible policy measures in order to achieve reductions in these emissions as well.

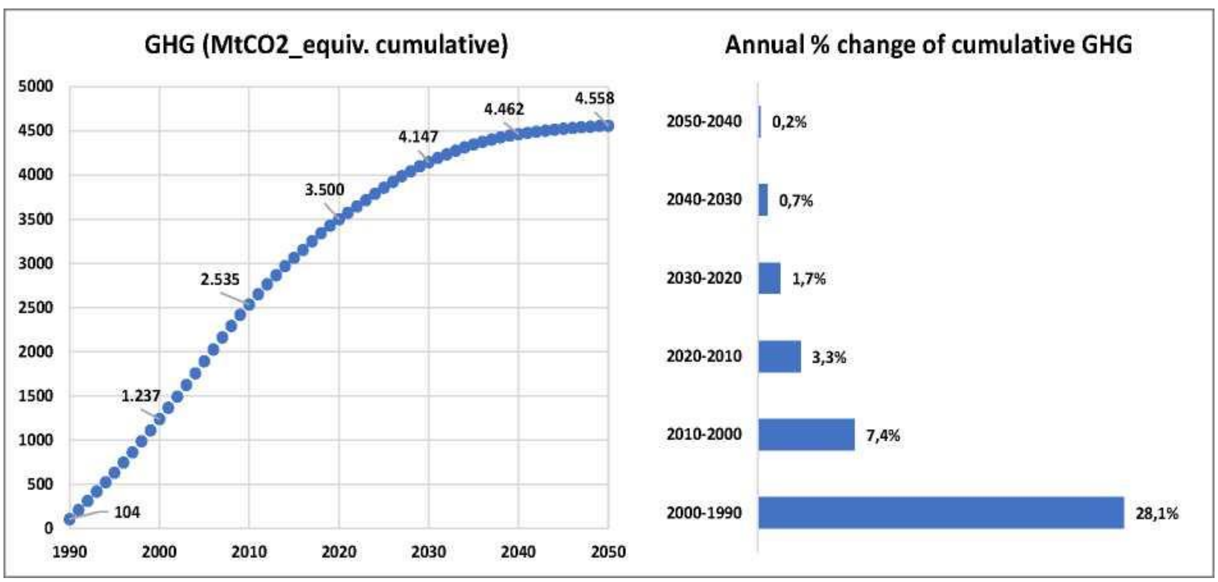


Figure 5 Cumulative emissions of greenhouse gases (excluding LULUCF), in million tonnes ofCO2 equivalents

Figure 5 shows the trajectory of cumulative GHG emissions, which isleading to reaching climate neutrality from 2050 onwards. There is also a maximum budget for GHG emissions over ten years (in million tonnes of$CO_{2\ risk}$): 647 for the decade 2020-2030, 315 for the decade 2030-2040 and 96 for the decade 2040-2050.

2.2.1.1 Greenhouse gas emissions other than carbon dioxide emissions

Greenhouse gas emissions other than carbon dioxide emissionstake F-gases, methane and nitrogen oxides emissions, mainly in the agricultural and waste management sectors. These-emissions are expected to decrease by 2030 due to the strengthening of policies andmeasures. The main measures and emission reductions, including:

- Emission reduction is driven by measures as described in Directive 1999/31/EC on the landfill of waste and its subsequentamendments (Directive (EU) 2018/850), which introduce restrictions on landfilling, seeking to reduce the amount of municipal waste. The amendment of the legislation strengthens the actions of EU Member States and is expected to significantlycontribute to the reduction of emissions in the solid waste sector.
- Existing EU F-gas regulations, including the new Regulation (2022/0099 (COD)) adopted by the European Commission, are expected to almost completely eliminate the use of hydrofluorocarbons (HFCs) in heat pumps and air conditioning (AC) for heating and cooling as early as 2025.
- Existing legislation at EU level, e.g. the EU Nitrates Directive (Directive 91/676/EEC), is expected to incentivise further measures regarding the control of nitrogen (N) fertilisation in agricultural soils. Such measures areintended to lead to additional reductions in nitrogen oxides emissions.

<u>Reducing emissions in the solid waste sector.</u>

A fundamental principle of national waste management policy is topromote the waste hierarchy, which leads to the gradual reduction of waste generated and landfilled.

The main axes/actions are:

- Strengthening sorting at source, with particular emphasis on separate collection and scrappingof bio-waste (urban and agro-livestock);

- The extension of the network of waste treatment plants (wasteA treatment plants, recycling recovery plants – RRF), waste water treatmentplants – MEVA),

- The production of alternative secondary fuels from the treatment of residual municipal waste for its energy recovery (energy recovery).

In particular, the target has been set at national level of limiting the disposal of wastein landfill sites to 10 % of total municipal waste generated in 2030, while in particular for biodegradable municipal waste destinedfor disposal, Joint Ministerial Decision 90439/1846/2021

(Government Gazette, Series II, No 4514) sets a target of reducing to 35 % the total amount (by weight) of biodegradable municipal wasteproduced in 1995 (or the nearest reference year). In order to achieve the above objectives, Joint Ministerial Decision 90439/1846/2021, which transposes Directive 99/31/EC asamended by Directive (EU) 2018/850 into national law, lays down a series of measures in accordance with Law 4819/2021 (Government Gazette, Series I, No 129) and the National Waste Management Plan (ESDA) and the National Waste Prevention Programme, which mainly refer to the promotion of the waste hierarchy with priority to prevention, including – taking into account reuse – and preparing for re-use and recycling.

These measures shall relate in particular to:

• strengthen food waste prevention, while encouraging donation and redistribution of food for human consumption. (Article 20 of Law 4819/2021),

• introduction of tax incentives to prevent the disposal of products fornatural burial and to enhance their donation (Article 21 of Law 4819/2021);

• establishment and strengthening of separate waste collection (Articles 25-29 of Law 4819/2021);

• the introduction of economic tools for waste prevention, such as the 'I pay for as well as the landfill' system, the landfill fee, the deposit refund system for specificcategories of beverage packaging, and rules are laid down for the cost accounting andthe calculation of the services provided by solid waste management bodies (Articles 37-39, 86 of Law 4819/2021);

• ensuring the separate collection of bio-waste from operators such aslive catering businesses, cuttings, food supermarkets, main hotels, food treatment and processing plants, provided that separate collection of bio-waste is started by the municipality concerned or operates a bio-wastetreatment plant (MEVA) serving the municipality concerned (No 50 v.4819/2021);

• donation of textiles, electrical and electronic equipment,
everyday hygiene products, footwear and books from producers,imports and distributors thereof when they are not suitable for sale but do not endanger public health. These products shall be disposed of in landfills following a solemndeclaration that the waste hierarchy has been exhausted (Article 19 of Law 4819/2021).

It should be noted that, as a general principle, since 2030, all waste that is suitable for recycling or other recovery, in particular as regards municipal waste, is not accepted in landfills, with the exception of waste for which landfilling produces the best environmentaleffects, in accordance with Article 4 of Law 4819/2021.

Fluorinated gases (F-gases)

Fluorinated gases, which are very powerful greenhouse gases, often 25.000 times more powerful than CO_2, account for 2.5 % of total greenhouse gases in the EU. They are used in daily products as well as in biologicalmechanical appliances. Hydrofluorocarbons (HFCs) are the most significant polluting F-gases from the point of view of climate change, despite the fact that they have a short lifespan. In addition, perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) can remain in the atmosphere for thousands of years. F-gases have adverse effects on climate change and measures are therefore being taken to eliminate and limit climate change. Between 1990 and 2014, F-gases had doubled, unlike other greenhouse gases, which are declining.

The existing Regulation (EU) No 517/2014 on fluorinated gases was adopted with the aim of reversing the increase in fluorinated gases in the EU. According to an assessment carried out by the European Commission, the application of the Regulation has indeed led to a reduction in fluorinated greenhouse gases. In particular, the supply of HFCs from 2015 to 2019 has decreased by 37 % in metric tonnes and by 47 % in tonnes of CO_2 equivalent. Also, there has already been a shift towards the use of alternatives with lower global warming potential (GWP), including natural substances such as air, CO_2, ammonia, water, etc. in equipment that-traditionally used F-gases.

The existing Regulation provides for emissions prevention and control offlows, control of by-products, end-of-life management of products and equipment, training and certification and control of the use of fluorinated gases. In addition, the existing Regulation introduced a quota system to implement a timetable for the gradual reduction of HFCs, which producersand producers can place on the market every year, with a view to abolishingthem and introduced restrictions on their use in a number of sectors.

Also, to limit fluorinated gases from mobile air-conditioning systems under Directive 2006/40/EC on emissions from air-conditioning systems in motorvehicles, the use of F-gases with a global warming potential of more than 150 is prohibited in all new cars and trucks since 2017.

In implementation of the Green Deal and the European Climate Law, there is a need to further reduce emissions of fluorinated greenhouse gasesin order to contribute to achieving emissions reductions of 55 % by 2030 andclimate neutrality by 2050. In this context, the Council and the European Parliament reached a political agreement on 5 October2023 on the new Regulation on fluorinated greenhousegases. The new provisions of the political agreement aim to further limit emissions of fluorinated gases and contribute tolimiting warming, in line with the Paris Agreement.

In particular, the agreement foresees that the consumption of HFCs will be phased out by 2050. The production and consumption of HFCs will be phased out, in line with a strict containment programme, with decreasing quota allocations and reaching a minimum level (15 %) by 2036.

It also provides for a global ban on the marketing of products and equipment containing HFCs, for various categories including refrigerants, alpha-persols, etc. The political agreement provides for a global ban on fluorinated gasesin small monoblock heat pumps and air-conditioning systems containing fluorinated gases with a global heating potential of at least 150, by 2032. For differentiated air conditioning systems and heat pumps, there is a universal ban on fluorinated gases contained therein by 2035. In addition, a new global ban on medium voltage switches based on F-gases is foreseen with a phase-out in 2030 and a ban on high voltage switches in 2032.

In application of the existing Regulation in Greece, checks are carried outand penalties are applied for non-compliance with the provisions of the legislation. The competent authorities carryout the check and, in the event of non-compliance, the relevant penalties are applied on the basis of Joint Ministerial Decision ΥΠΕΝ/ΔΔΕΔ/85858/2124 (Government Gazette, Series II, No 6777).

Nitrogen oxides emissions from nitrates from agricultural origin

As a country, we must implement Directive 91/676/EEC, providing the EU every 4 years with the relevant report on the status of pollution caused by nitratesand groundwater with the corresponding processed data in tables posted on the EIONET.

2.2.1.2 LULUCF – Land Use, Land Use Change and ForestrySector

In the land use, land use change and forestry (LULUCF) sector, the new European targets include for Greece:

- For the period from 2021 to 2025, greenhouse gas emissions from the LULUCF sector shall not exceed the removals of greenhouse gases, taken together on the territory of Greece and across all land accounting categories.

- For 2030, Greece's target for net greenhouse gas removals inthe LULUCF sector is -4.37 Mt CO_2eq and represents a 36 % increase in removals over the period 2016-2018.

For this sector, in the period 1990 – 2021, removals in total in the land accounting categories included in it ranged from -2 Mt CO_2minutes to -5.5 Mt CO_2eq.

The LULUCF sector is projected to remain a net sink at least until 2040 and needs to continue with higher absorption until 2050 and beyond to compensate for residual and inflexible GHG emissions.

In fact, the storage capacity of the sector is expected to increase in the next period from -5.4 Mt CO_2eq in 2020 to -5.6 Mt CO_2e.V. in 2040 (WEM scenario – implementation of existing measures) and should exceed 6 Mt CO_2minutes in 2050.

Forests play the most important role in these removals. It is the largest permanent carbon sink. As part of an integrated monitoringsystem for Greek forests, the Ministry of Environment and Energy is currently implementingthe project to install and operate a system for the first time.

Inventory and monitoring of the country's forests and woodland, which is expected to provide further data for estimating removals of this sink by the year 2025.

Please note that estimates ofemissions and removals from 'unmanaged' forests, i.e. forests, for which no management studies are available, are to be included in the inventories in the coming years. These forests have so far been recorded as land in the greenhouse gas inventories and their inclusion in the calculation of emissions and removals is expected to increase the contribution of Greece's forests towards climate neutrality].

The policies and measures taken into account in the projections of emissionsand waves in the forest sector shall include:

- Strengthening the protection of forests against natural disasters
- Afforestation and restoration of degraded areas
- Afforestation of agricultural land
- Production of long-life wood products

In line with current emissions estimates, the implementation of the above policies is estimated to contribute up to 2400 $ktCO_2eq$ in addition to removals in relation to the absence of measures in this sector.

In addition, climate mainstreaming in forest management, with measures to increase carbon storage in forests, can contribute to increasing removals in the future.

The emission projections report still envisaged the following additional measures:

- increase woody energy crops to produce biomass to 50.000 ha by 2030 (afforestation): additional 192 Kt CO2eq removals in year 2040.
- increase in removals from wood products: additional 400 Kt CO2eq removals in year 2040.

With regard to the above, it should be noted that Greece’s inventories record changes in soil organic carbon stocks on agricultural land, as and all land-use change. Integrating new soil carbon data sources into each land accounting category, distinguishing between mineral and organic soils, will increase accuracy in the calculations.

Please note that based on Greece's previous emission forecast report for 2040 (submitted in 2021, based on the data and inventories in force in that year), the measure in question as originally planned, i.e. 30.000.000 seedlings in 500.000 stremma by 2025, was estimated to provide an additional 0.55 Mt CO_2eq removals.

Table **3** Indicative projection of LULUCF potentials shows an indicative projection of LULUCF under the NECP.

NECP (Apr 2023)	Central scenario projections							
	2015	2020	2025	2030	2035	2040	2045	2050
Total forest	— 2.1	— 2.2	— 2.2	— 2.6	— 3.0	— 3.5	— 3.5	— 3.7
Management of existing forests	— 2.1	— 2.2	— 2.2	— 2.6	— 3.0	— 3.5	— 3.5	— 3.7
Afforestation/reforestation	— 0.1	— 0.1	— 0.1	0.0	0.0	0.0	0.0	0.0
Deforestation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crop management	— 1.1	— 1.3	— 1.4	— 1.5	— 1.6	— 1.7	— 1.9	— 2.0
Management of existing crops	— 1.1	— 1.3	— 1.5	— 1.5	— 1.6	— 1.7	— 1.9	— 2.0
Land converted to crop	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Management of meadows	— 1.3	— 1.9	— 0.7	— 0.6	— 0.5	— 0.4	— 0.4	— 0.3
Management of existing meadows	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land converted to grassland	— 1.3	— 1.9	— 0.7	— 0.6	— 0.5	— 0.4	— 0.4	— 0.3
Wetlands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agglomerations	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Other land	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logging and wood products	0.1	— 0.2	— 0.2	— 0.2	— 0.2	— 0.2	— 0.2	— 0.2
Total LULUCF in million tonnes of CO2 equivalent	**— 4.3**	**— 5.4**	**— 4.4**	**— 4.8**	**— 5.1**	**— 5.6**	**— 5.8**	**— 6.0**

Table 3 Indicative projection of LULUCF potential

Adaptation to climate change

The process of adaptation to climate change is an integral partof attracting the country's development model, as well as protecting socialpartners. In this context, it is a priority to prepare for theimpacts that climate change may have on energy planning and the achievementof national climate neutrality targets.

2.2.2 reduction of transport emissions

Reducing air emissions from the transport sector is a key priority on the country's path towards climate neutrality by 2050.

The gradual decarbonisation of the transport sector in 2030 is projected to rely mainly on the penetration of biofuels (doubling compared to 2021) and electricity in road transport (3 % share of total consumption inhind transport compared to 0.3 % in 2021). The penetration of biofuels and electricityis driven by policies such as the revised RED targets and policies imposing maximum limits on the final emissions of the new vehicle fleet.

	2021				2030			
	Road	Ferro-dro	AirRubber	Sea *	Road	Ferro-dro	AirRubber	Sea *
Overall energy consumption (000 tip)	4782	22	999	2385	4503	47	1267	2,675
Fossil fuels/natural gas	4565	7	999	2385	3930	27	1203	2395
Biofuels/biomethane	216	0 — —	0 — —	0	423	4 4	63 63	215
Synthetic fuel/ gas	0	0	0	0	0	0	0	0
Electricity	1	15	0	0	121	16	0	64
Hydrogen	0	0	0	0	30	0	0	0
CO2 emissions *	14242	23	3138	8350	11740	83	3599	7618

Table 4 Energy consumption (in 000 tips) by transport sector and fuel type,and CO2 transmitters (kt CO2-eq) by transport sector for 2021 and 2030

** In Table 4 maritime transport includes coastal and seagoing shipping.*

This NECP **sets updated and more ambitious targets for reducing CO_2 emissions from new passenger cars, as well as for the first time targets for light lorries (LCVs)** 5 (road transport sector), mainly through electrification of this sector. **Targets for other transport sectors and categories (e.g. heavyown transport, maritime transport, etc.) are also set for the nexttime** by **adopting a combination of technologies and solutions**, such as the use of renewable liquid and gaseous fuels and electro-mobility.

The gradual electrification of certain transport sectors enables the energy sectors to be coupled and

5Light lorries means light commercial vehicles up to 3,5 tonnes (LCVs).

greater participation of RES in the distributionof energy in transport. The target for the share of RES in thetransport sector is projected to be significantly higher for 2030, compared to the 2019 NECP targets, reaching 29 % from 19 % in 2019.

At the same time, there is a demand for renewable fuels, due to their use in thetransport sectors, with the demand for biofuels in the transport sector expected to triple by 2030 compared to 2021 levels, which is also a prerequisite for the necessary investments to be made in order toexpand their production.

As a result of the above, in particular **for the land transportsector there is a reduction in emissions of more than 15 % in 2030 compared to 2021** (Pina 14), thus compensating for the increase in consumption in maritime and air transport due to increased activity and the comparatively reducedpenetration of clean fuels.

1 .2.2.1 road transport

I. Light Road Transport

The new targets set in the draft NECP revision to reduce the carbon footprint of transport, in particular light road transport, are rooted in the successful achievement of the existing targets to date.

Progress towards the decarbonisation targets for light road transport in 2020-2023

The promotion of electro-mobility in Greece was placed as a key policy axis onthe side of the NECP drawn up in 2019, which highlighted the urgent need to complete the relevant regulatory framework and to implement appropriate measures, incentives and policies for the development of the electro-mobility market, including thenetwork of charging infrastructure for electric vehicles. This plan set for the first time specific quantitative annual targets for road transport andfor electrification of the passenger car fleet, accordingto which (front-loaded scenario) 30 % of new vehicles to be registered in 2030 should be electric (BEV).

The above targets were set from 2019, the year in which 480[6] new electric passenger cars (BEV) were registered and the share of electric vehicles in new registrations reached 0.4 %[7.] Total fleet of circulating electricity

[6] Data from the Association of Importers of Automotive Representatives (SAA) (https://seaa.gr/)

[7] Data from the Association of Importers of Automobile Representatives(SNA) (https://seaa.gr/), at the end of the same year, was 1.225,6 while the publicly accessible chargingstructures installed in the country were less than 1007.

The first and most important milestone towards the electrification of road transport was the adoption in Greece of the first legislative framework for the promotion of electromobility (Law 4710/2020), as a result of a holisticapproach and 'cross-sectoral' cooperation. This legislative framework includes a network of fiscal, development and other incentives (such as free parking of electric vehicles, free movement within the Dictylium in Athens), measures and institutionalbases for both electric vehicles and charging infrastructure (private use and publicly accessible). Further main points are the regulation of the electric mobilitymarket and the establishment of the Register of Infrastructure and Market Operators forMobile Electricity (MYFAT).

The basic legislative and regulatory framework was complemented by a number of measures and policies implemented, using financial resources from various sources (for example: Recovery and Resilience Fund, Green Fund, Revenue from unallocated greenhouse gas emission allowances, Ordinary Budget of the Ministry of RuralDevelopment and Energy, etc.) with a view to developing the new electro-mobility market.

More specifically, programmes for the electrification of vehicles havebeen activated with a total budget of more than EUR 160 million from August 2020 onwards, such as the 'Insulating Electrical' Programme (GG I[10] and B[11]), the PrasTaxi Action[12] and the 'e-Astypalea[13]' programme. Strong incentives through these programmes to both individuals and businesses to acquire electric vehicles such as passenger cars, light trucks (vans), taxi[14], bicycles/tricycles, microcars and bicycles have given a significant boost to e-mobility and green transport including micro-mobility.

In total, 31.068 vehicles were applied for in the above programmes, one[out] of five for pure electric cars, taxis and light trucks (vans), the rest being two-/three-wheeled/micro-cars (1 out of 3) and bicycles(1 out of 2).

Subsequently, and after the above measures were implemented for two years, the first National Climate Law introduced[8]specific restrictions/targets forCO_2emissions in the road transport sector, both for the whole country and for individual transport/business sectors, which concern, for rather than once, new

6 Data from the Association of Importers of Automobile Representatives (SAA) (https://seaa.gr/) for the years 2013-2019
7According to data from FIFC for the years 2013-2019
8 Law No 4936, Government Gazette, Series I, No 105/27.5.2022 on the National Climate Law Transition to Climate Neutrality and Adaptation to Climate Change, urgent provisions to tackle the energy crisis and protect the environment

vehicles for hire to third parties, taxi vehicles and company vehicles.

[10] Joint Ministerial Decision ΥΠΕΝ/ΕΣΠΑΕΝ/77472/520 (Government Gazette, Series II, No 3323/07.08.2020) – Notice of the action 'Kinoumai Electrical'. The 1 cyclewas open for applications from August 2020 to December 2021 inclusive.

[11] Joint Ministerial Decision ΥΠΕΝ/ΑΤΗ/70517/238 (Government Gazette, Series II, No 3981/27.07.. 2022) – Notice of action 'Kinoumai Electricika – Second Cycle'. The 2 cycle was activated for applications in July 2022 and will remain open until December 2023.

[12] Joint Ministerial Decision ΥΠΕΝ/ΑΤΗ/137582/646 'Notice of action entitled green taxi'; to be implemented with the support of the Recovery and Resilience Fund ('Β6789/28-12-2022)

[13] Joint Ministerial Decision No ΥΠΕΝ/ΑΤΗ/78654/257 'Notice of the e-Astypalea action' (Government Gazette, Series II, No 3961/30-8-2021).

[14] In this text, taxis refers to IWT vehicles (taxi)

[15] The data from the above mentioned subsidy programmes were collected on 5/10/23 and concern only active at any stage and completed applications.

The development of the necessary charging infrastructure for electric vehicles is one of the main focus on the development of the necessary charging infrastructure for electric vehicles since the first policy measures put inplace. One of the first steps was to carry out a specific strategic study on the needs for the development of a network of publicly accessible charging points in the country by 2030. This study highlighted the need for a balanced development of an adequate network of publicly accessible charging points in Greece, while meetinggraphic and population criteria, with a focus on urban areas where access to private parking places is more difficult. At the same time, the deployment of ultra-fast charging infrastructure of 150 kW and above along motorways and national roads has become crucial for the promotion of electromobility. In addition, the studyconcluded in the proposal that the majority of the necessary charging points by 2025 should come from the allocation of first-tier local authority areas to private bodies that will develop and operate this infrastructure. To this end, and in the context of the 'implementation' of the relevant provision of Law 4710/2020, planning was drawn up bythe local authorities, which led to the siting of approximately 9.000 new public charging points across Greece in areas under the responsibility of first-tier local authorities.

In addition, with a view to the rapid development of publicly accessible charging stations, the action "Weller Fortizo everywhere" 17 was launched, with a budget of EUR 80 million, providingfinancial incentives for the supply, installation and connection to the electric drum, publicly accessible charging stations, powered by electricitygenerated from renewable energy sources (RES); with a view to installing 8.000 publicly accessible electric vehicle charging stations throughout the country, in shared areas in cities, in key transport infrastructure and in private spaces with public access, such as petrol stations, car parks and other points of interest.

Thanks to the frontloaded strategy and implementation of all ofthe above-mentioned complex measures and policies, the annual quantitative targets set in the NECP have been exceeded for all previous consecutive years (2020-2021-2022), as shown in

[17] Joint Ministerial Decision No ΥΠΕΝ/ΑΤΗ/49144/468 of the action entitled 'Load above', to be implemented with the support of the Recovery and Resilience Fund, under Recovery Pillar 1 'Green Transition' Priority Axis 1.3 'Towards a green and sustainable transport system' of the NRRP Greece 2.0. (GOVERNMENT GAZETTE, SERIES II, NO 2966/5-5-2023).

Table 2 and Figure 6, with total registrations of new electric passenger cars; it now reaches 29.62518, 24 times more than in 2019.

YEAR	NECP OBJECTIVE	ACTUAL CLASSES LAWS/	EU-CVT TARGET COVERAGE (%)	MISCELLANEOUS NECP – P. OF MAMMALS CLASSIFICATIO N
2020	**1.265**	**2.135**	**169 %**	**870**
2021	**3.795**	**6.961**	**183 %**	**3.166**
2022	**7.589**	**8.320**	**110 %**	**731**

[18] Data from PCAs for the period from 2020 to September 2023 inclusive

Table 5 Comparison of forecasts of the previous NECP and actual registration datafor electric passenger cars

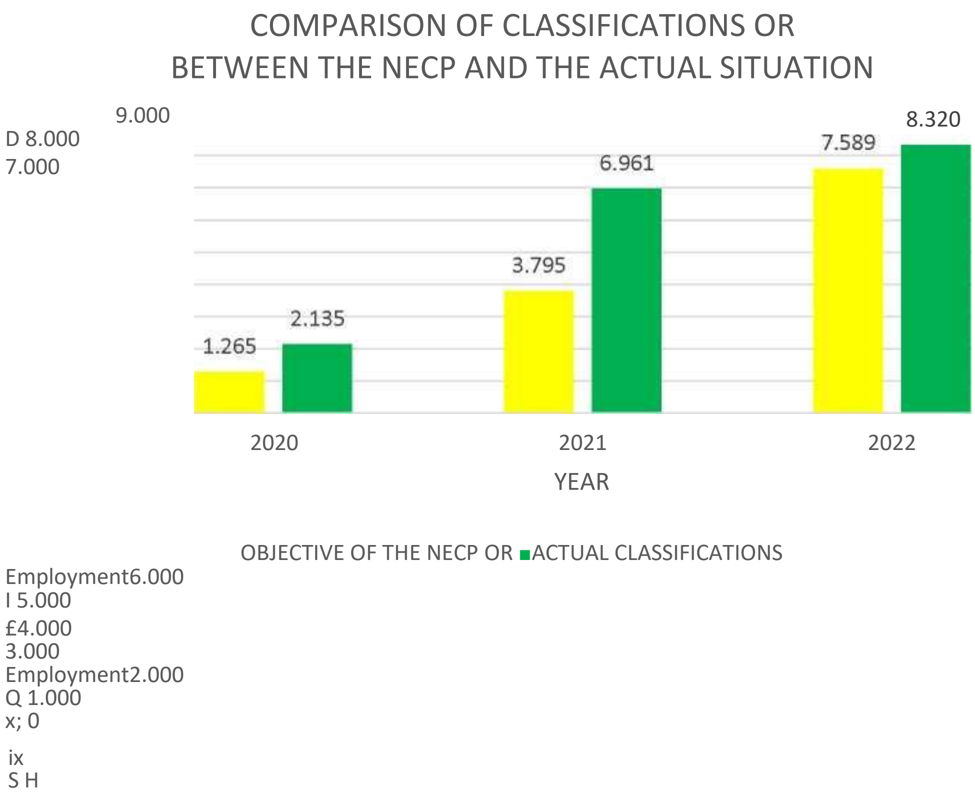


Figure 6 Comparison of annual NECP targets and actual (passenger) classifications for the years 2020 to 2022

Inaddition, by September 2023, 4.014[9] publicly accessible charging points have been installed throughout the territory, 55 times more than in 2019. (Picture 2)

9 According to data from the Ministry of Finance at 13/10/23 ([https://electrokinisi.yme.gov.gr)](https://electrokinisi.yme.gov.gr)

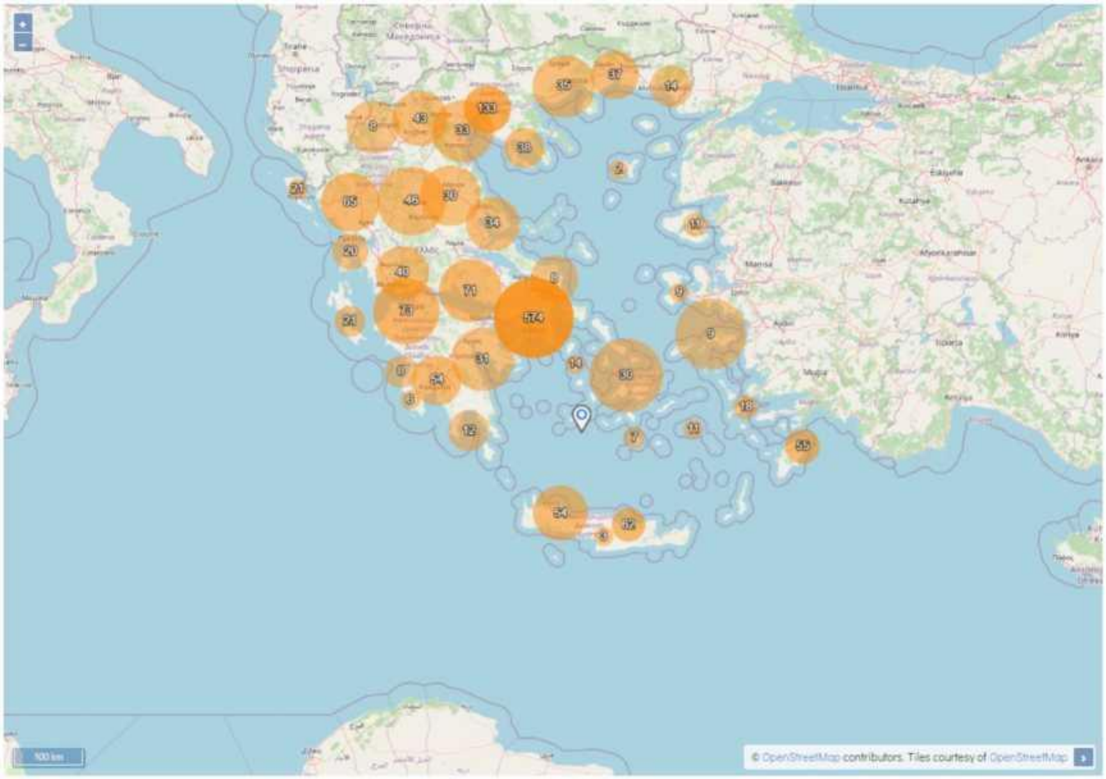


Figure 1 Public accessible charging points as reflected in the MYFID.

Fleet penetration targets for electric vehicles by 2030

As part of the draft revision of the NECP, existing targets are being updated and new CO2 reduction targets for **new** light-duty vehicles[20] expected to be registered in Greece in the following years, by 2030 in the first phase, and by 2035 at a later stage, in line with the mandatory CO_2 emission ceilings set at both European (Fit-for-55) and national level, and in line withthe Climate Law (Law 4936/2022).

[20] light duty vehicles are defined as passenger cars (IX and taxis) of type M1, light commercial vehicles up to 3,5 tonnes (LCVs) of type N1 and L-type vehicles (two-/tricycles/quadricycles).

In particular, Tables 3 and 4 include an update of the existing targets for new passenger cars and the adoption for the first time of separate targets for light lorries, respectively, each year by 2030. Both Tables (3 and 4) in this proposalpresent two different scenarios where specific annual quantitative targets are set by 2030, both in terms of number of vehicles and market share of electric vehiclesor in relation to the total planned new vehicle registrations. The two boxesin this draft NECP are defined as follows:

- **Scenario A – Baseline Scenario: A**scenario in which the continuation of existing port measures (such as, but not limited to, the 'Kintum Electrical' and 'Load everywhere' subsidy programmes) is a necessary condition for achieving the objectives set, without any additional measures being taken.
- **Scenario B – Aisodox Scenario: A**scenario in which the implementation of increased measures to promote electro-mobility is a prerequisitefor achieving the targets set. Please note that it has been-assumed that the increased policy measures to be implemented will have a positiveimpact both on the electric vehicle market and in the total number of new passenger cars (all types of fuels), as shown in Tables 3 and 4 respectively**.**

In addition, it should be noted that in these tables, the data for the years 2018 to 2022 reflect the actual situation of classifications in those years. The number of registrations of new vehicles on the market (of alltypes of exhaust) is visibly reduced compared to the planned NECP 2019 targets. Despite this reduction, and taking into account the emission ceilings set in the medium and long term (Fit-for-55, Climate Law), the annual targets for new electric passenger cars **by 2030 have been revised upwards**, on the basis of the optimistic scenario adopted in this draft (Scenario B in Table 3), **while ambitious targets are also set** for light lorries (Table4), with market shares reaching 50 % and 40 % respectively.

As regards the distribution between the types of electric vehicles (pure electricreceptacles -BEVs compared to plug-in hybrid vehicles – PHEVs[10]) in Tables 3 and 4, this is estimated at 50 % -50 % in 2024, with a gradual shift to 67 % -33 % in 2030 in favour of pure electric vehicles. For light lorries, the proportion of AI-electrically BEV is projected to exceed 90-95 % compared to plug-in hybrid PHEVs throughout the period up to 2030.

Screenplay	Year	Purchase of new passengers	Change in total passenger market	Increase in total market	Passenger BEV-PHEVs	Annual increase	BEV percentage — PHEV on an annual
1 ff ZL	2018	103.431	— —	— —	314	— —	**0.30 %**
— D	2019	114.109	10.678	10 %	480	166	**0.42 %**
P— I- 3	2020	80.977	— 33.132	— 29 %	2.135	1655	**2.64 %**
C	2021	100.911	19.934	25 %	6.961	4826	**6.90 %**
THE “• Ω > 3	2022	105.283	4.372	4 %	8.320	1359	**7.90 %**
THE	2023	*130.000*	*24.717*	*23 %*	*12.740*	*4420*	***9.80 %***
the	2024	*136.500*	*6.500*	*5 %*	*17.063*	*4323*	***12.50 %***
‘° 77	2025	*143.325*	*6.825*	*5 %*	*21.499*	*4436*	***15.00 %***
* c ☐ t	2026	*150.491*	*7.166*	*5 %*	*26.336*	*4837*	***17.50 %***
> o H UN F	2027	*158.016*	*7.525*	*5 %*	*31.603*	*5267*	***20.00 %***
£	2028	*165.917*	*7.901*	*5 %*	*38.161*	*6558*	***23.00 %***
2 h	2029	*174.212*	*8.296*	*5 %*	*45.295*	*7134*	***26.00 %***
§ >	2030	*182.923*	*8.711*	*5 %*	*54.877*	*9582*	***30.00 %***
mo nth	2018	103.431	— —	— —	314	— —	**0.30 %**
m	2019	114.109	10.678	10 %	480	166	**0.42 %**
virN usN/a	2020	80.977	— 33.132	— 29 %	2.135	1655	**2.64 %**
sho	2021	100.911	19.934	25 %	6.961	4826	**6.90 %**
2	2022	105.283	4.372	4 %	8.320	1359	**7.90 %**
olir C NY	2023	*130.000*	*24.717*	*23 %*	*12.740*	*4420*	***9.80 %***
£v	2024	*136.500*	*6.500*	*5 %*	*20.475*	*7735*	***15.00 %***
UNI Ř	2025	*147.420*	*10.920*	*8 %*	*28.010*	*7535*	***19.00 %***

[10] Plug-in hybrid -PHEV in the text means externally chargeable hybrid electric vehicles

2026	*159.214*	*11.794*	*8 %*	*38.211*	*10201*	***24.00 %***
2027	*171.951*	*12.737*	*8 %*	*51.585*	*13374*	***30.00 %***
2028	*185.707*	*13.756*	*8 %*	*66.854*	*15269*	***36.00 %***
2029	*200.563*	*14.857*	*8 %*	*86.242*	*19388*	***43.00 %***
2030	*216.608*	*16.045*	*8 %*	*108.304*	*22062*	***50.00 %***

Table 6 Targets for the penetration of new electric passenger vehicles in total registrations on the Greek market towards 2030 (Scenario A – Baseline Scenario, Scenario B – AisodoxSince)

Screenplay	Year	Purchase of new light trucks	Change in the purchase of trucks	total light	Increase in total market	BEV- PHEV light lorries	Annual increase	BEV percentage — PHEV on an annual
Scenario A (Policy Stage — continuation of existing ones — Scenario)	2018	6.905	— —		— —	13	— —	**0.2 %**
	2019	7.972	1.067		15 %	11	— 2	**0.1 %**
	2020	6.865	— 1.107		— 14 %	14	3	**0.2 %**
	2021	10.426	3.561		52 %	106	92	**1.0 %**
	2022	9.660	— 766		— 7 %	169	63	**1.7 %**
	2023	*10.400*	*740*		*8 %*	*730*	*561*	***7.0 %***
	2024	*10.920*	*520*		*5 %*	*1.092*	*362*	***10.0 %***
	2025	*11.466*	*546*		*5 %*	*1.433*	*341*	***12.5 %***
	2026	*12.039*	*573*		*5 %*	*1.806*	*373*	***15.0 %***
	2027	*12.641*	*602*		*5 %*	*2.212*	*406*	***17.5 %***
	2028	*13.273*	*632*		*5 %*	*2.655*	*442*	***20.0 %***
	2029	*13.937*	*664*		*5 %*	*3.136*	*481*	***22.5 %***
	2030	*14.634*	*697*		*5 %*	*3.658*	*523*	***25.0 %***
Scenario B (Aisodox Scenario – adoptionof increased policy measures to promote electromobility)	2018	6.905	— —		— —	13	— —	**0.2 %**
	2019	7.972	1.067		15 %	11	— 2	**0.1 %**
	2020	6.865	— 1.107		— 14 %	14	3	**0.2 %**
	2021	10.426	3.561		52 %	106	92	**1.0 %**
	2022	9.660	— 766		— 7 %	169	63	**1.7 %**
	2023	*10.400*	*740*		*8 %*	*730*	*561*	***7.0 %***
	2024	*10.920*	*520*		*5 %*	*1.201*	*471*	***11.0 %***
	2025	*11.794*	*874*		*8 %*	*1.769*	*568*	***15.0 %***
	2026	*12.737*	*943*		*8 %*	*2.420*	*651*	***19.0 %***
	2027	*13.756*	*1.019*		*8 %*	*3.301*	*881*	***24.0 %***
	2028	*14.857*	*1.100*		*8 %*	*4.308*	*1007*	***29.0 %***
	2029	*16.045*	*1.189*		*8 %*	*5.455*	*1147*	***34.0 %***

2030	*17.329*	*1.284*	*8 %*	*6.931*	*1476*	***40.0 %***

Table 7 Targets for the penetration of new electric light lorries (LCVs) outof total registrations on the Greek market towards 2030 (Scenario A – Baseline Scenario, Scenario B – Aisodox Scenario)

The adoption of increased policy measures (Scenarios B Tables 3 and 4) will lead to thesmallest electrification of the fleet of passenger cars and light lorries (LCVs) in Greece, with their fleet in circulation[22] expected to increase from around 30.600 vehicles currently[23] to about 85.000 vehicles in 2025 and to more than 460.000 vehicles in[2030].

II. Heavy Road Transport

In particular for **heavy-duty vehicles[25]**, it is important to mention that most of the registrations of such vehicles, mainly lorries, in Greececoncern second-hand vehicles imported into Greece. This significantly delays the reduction in the carbon footprint of vehicles in circulation by the new, lower CO_2 CO 2 limits imposed on new heavy vehicles under the relevant European Directives.

[22] The figures refer only to the sum of all new annual classifications from 2013 to 2030 according to actual data and based on the forecasts in Tables 3 and 4. Used vehicles are not included.

[23] Data up to September 2023 inclusive.

[24] Individual distinct targets for the two-wheel/tricycle sector (vehicle category L) are expected to be adopted in the final revision draft NECP after further study.

[25] Heavy duty vehicles means vehicles for the carriage of goods with a maximum mass exceeding 3,5 tonnes;

With regard to the choice of technology and fuel for this category of vehicles, in the context of the long-term objective of climate neutrality, the following solutions per use are preferred, which of course will always be considered, depending on developments in technology and costs:

- For *trucks travelling short distances (short-haul)*, the adoption of measures to electrify the sector

- For long-haul trucks
  - Adoption of measures for use

electricity

a green hydrogen-combination of technological solutionsthat include electricity, green hydrogen as well as

gaseous fuelgaseous fuels as a mixture of mixed carbonatebeakers

2.2.2.2 Urban transport – Use of LMT

The draft NECP revision focuses on reducing CO_2CO2 emissions specifically in urban transport, by adopting policy measures that will help counter traditionalforms and methods of transport. The aim is to develop-alternative forms of mobility such as micro-mobility (e.g. cycling) and active mobility, as well as increasing the use of Mass Transport (MMT), which in turn should adopt reduced carbon footprint solutions-(electrification of a bus fleet, development of a metro network, etc.).

In addition to contributing to the reduction ofCO2 CO2emissions in urban centres, the above axes are intended to contribute to the conversion of congested Greek cities into sustainable mobility cities, i.e. to make them less human-orientedthan the car and soft traffic. In this context, it is considered to adopt a specific sub-target to increase theshare of the use of private motorised means over soft and collective-mobility (walking, bicycle – MMT), e.g. by 20 %.

Public Urban Transport

Public transport is always the key pillar of sustainable urban transport. Taking into account the guidelines from the European and nationalinstitutions, the aim is to include the use of electric vehicles and to gradually increase the number of low-emission vehicles to serve urban mobility.

In particular, for road transport in the Athens metropolitan area, and witha definition set for 2030, specific Green Mobility targets have been set[11]:

- 20 % boost to the fleet with low-emission vehicles by 2025, compared to 2019
- 40 % boost to the fleet with low-emission vehicles by 2028, compared to 2019
- A reduction in the value of the fleet vehicle emissions index (CO2eq/km/passenger) by 8 % compared to 2019. (Medium-Term – Continuous)

[11] Project “Roadmap for aligning the OASA Group with the European Green Deal 2023-2028”

2.2.2.3 Charging infrastructure for electric vehicles

The draft revision of the NECP makes **specific reference for the first time to the alternative fuels infrastructure** that is necessary to develop for the fuelling of vehicles, such as electric charging infrastructure and hydrogen fuelling infrastructure. The rapid and balanced development of this infrastructure is a prerequisite for achieving the objectives of climate neutrality in the transition, by increasing the uptake of electric vehicles and the use of alternative fuels respectively.

The objectives set for the development of publicly accessible electricity charging infrastructure[12] aim at achieving the national targets for promoting electro-mobilityin road transport and enable the obligations arising at European level from the new Regulation on Alternative Fuels Infrastructure (AFIR) to be met in each EU Member State separately. According to that regulation, public pre-installed charging stations with a total power output corresponding to at least 1.3 kW for each pure electric vehicle (passenger or vans) and 0.8 kW for each plug-in hybrid vehicle must be installed in the country on an annual basis.

Specifically for the Trans-European Road Network (TEN-T), with a distinction between the main and secondary networks, this NECCP, on the basis of the new Regulation on Alternative Fuels Infrastructure – AFIR, provides for a programme for the development of publicly accessible fast infrastructure per specific distance, establishing the minimum required power output of each such installation. In particular, separate targets are set for charging infrastructure serving light-duty vehicles and those serving heavy-duty vehicles, with a time horizon until 2035 and intermediate milestones in 2025, 2027 and 2030.

On the basis of this ratio, and on the basis of forecasts for the fleet of new electric vehicles (passenger and light vans), which will be registered annually in the country (5 and 6 above), an estimate is made for a total installed power output in publicly accessible charging infrastructure exceeding 550 MW by 2030.

At the same time, in terms of number of publicly accessible charging points, based on astudy carried out in 2021 with the support of the European Investment Bank's Technical Assistance Facility (JASPERS), it was estimated that up to 13.000 publicly accessible charging points would-be needed by 2025, with this number increasing significantly for 2030 (estimated for 40.000 – 100.000 charging points).

12 Publicly accessible electrical charging infrastructure in this text means publicly accessible recharging points, which provides electricity with non-discriminatory access to all users. Non-discriminatory access may include different terms of authentication, use and payment.

2.2.2.4 Rail transport

In rail transport, a significant reduction in CO2 emissions is expected from electro-mobility to be further developed, based on two strategic axes:

- **Electrification of existing railway lines in the network**to electrify the largest proportion of the rail network in order to minimise the movement of polluting diesel cars. In particular, the length of the existing railway line which will be electrified is projected to increase by 15 % by 2030.
- **Construction of new** electrified **railway lines** to moveroad traffic to rail, with the aim of adding new electrified lines with a length of 244 km by 2030

2.2.2.5 Maritime transport

The draft revision of the NECP includes targets and a programme of measures toreduce CO_2 emissions from shipping, a sector of major importance for the country due to its insularity and international presence. However, further consideration should be given to the most advantageous solution for propulsion and fuel technology, on a case-by-case basis, given that there are still uncertainties. The policy of support measures must be technology-neutral, provided that it is compatiblewith the objective of climate neutrality, but must also ensurethe necessary supply and storage infrastructure.

A prerequisite for a successful "green" transition of shipping to coal is the availability of safe alternative fuels in sufficient quantities across the globe and low or zero carbon footprint technologies.

Recent decisions by the International Maritime Organisation (IMO/MEPC 80, July 2023) on binding absolute greenhouse gas (GHG) emission reduction targets also pave the way for the use of biofuels in shipping and the calculation of their life-cycle carbon footprint.

"Drop-in" fuels, such as biodiesel, renewable (advanced) diesel, biomethanol, are fully blended with the corresponding fossil fuels and are compatible with the nautical engines of existing seagoing ships, requiring minimum technical safety adjustments or no alterations to the naval engines using them and the fuel distribution network.

At the same time, Carbon Capture and Storage – CCS has been included in the IMO's sustainable pathways and is thought to be oneof the options for ship ownership to achieve the objectives of decarbonising-shipping. In addition, it is appropriate to take into account that captured CO2 from the capture of gaseous emissions using CCS onboard technology may beused as a feedstock, e.g. for the production of alternative fuels with a lowcarbon footprint, e.g. blue Methanol.

As things stand, the choice of technology and fuel will be further studied and may be revised taking into account developments in therelevant minds and costs:

Coastal ferries

The majority of coastal shipping lines are less than 50 nautical metres, with the largest line at 154 nautical miles. The capacity of the vessels on the routes (onthe basis of short tracks) begins with 50 passengers and reaches up to 450 passengers. Inthe light of the above elements, the following axes/guidelines on responding to maritime coercion are examined:

- Application of electro-mobility to ships sailing mainly on ferry routes
- Focus on arid lines to consider on a case-by-case basis and the appropriateness ofspecific options
- Use of alternative fuels in larger ships sailing longer andregular distances
- Use of electricity to power vessels at berth throughcoldironing– *(based onAFIR)*

Seagoing shipping

- Follow-up international research to identify your most advantageous solution
- Policy Options in line with IMO and EU.

Achieving climate neutrality in seagoing shipping has significantpre-calls. But this is a global problem.

2.2.2.6 Air transport

The draft revision of the NECP includes targets for reducing CO2 emissionsfrom aviation, promoting Sustainable Aviation Fuels (SAF) for aeroplane feeding. This direction for the promotion of sustainable aviation fuels, as well as a parallel levelplaying field, are set as key axes by the new European Refuel AviationRegulation, with the introduction of specific targets for the use of SAF fuels in aviation.

The sustainable development of air transport requires the adoption of measures and incentives to support biofuel production activity in Greece, involving both the agricultural and industrial sectors, including economic instruments for research and development of the sector. Targeted support and funding at national level, as well as public-private partnerships, canimprove the availability and financial sustainability of relevant fuels to further accelerate their supply and deployment.

At the same time, targeted actions should be implemented with regard toair ports and the ground infrastructure of air transport, promoting both the insulation ofenergy and the reduction of their carbon footprint, as well as the developmentof infrastructure for the supply of electricity through a standardised fixed or mobile platform to aircraft parked at gates or delimited parking areas at the airport.

Summary of projections under the NECP for the transport sector

Table 8 shows a summary of the numerical projections under the NECP:

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	M 2025	2030	2035	2040	2045	2050

Energy efficiency ofpassengers transport (toe — kilometres)	30.9	29	27.8	23.4	19	15.6	13.3	11.7
Energy efficiency and flow efficiency transport (toe/million tonne-km)	42.2	39.4	37.8	34.3	31	27	23.7	21.1
On-km cars with electric traffic as% of total	0 %	12 %	3 %	20 %	50 %	72 %	87 %	98 %
Tono-km meta-media with electricity or hydrogen as% of total	0 %	0 %	0 %	3 %	10 %	23 %	44 %	61 %
Earth carbonfootprint on transport (tCO2/τιπ)	3.15		3.02	2.87	2.32	1.61	0.87	0.2

Table 8 Objectives – NECP projections for climate performance in the transport sector

2.2.3 Penetration of renewable energy sources (RES)

2.2.3.1 Summary of objectives and priorities

The GHG emission reduction target is specified and achieved through binding targets for the penetration of renewable energy sources (RES) in totalcarbon energy consumption. The EU has put in place a binding policy framework that ensures that, as a whole, it will secure these important targets, measured through specific indicators and mathematical formulae, set by the EU (EU target is to reduce greenhousegas emissions by at least 55 % below 2030 values by 1990).

The NECP looks forward to the development of RES in all sectors, so that RES become the main pillar of the green transition through direct use for energyproduction and indirectly for the production of green hydrogen and climate-neutral fuels.

The target for RES as a share of total gross energy consumption for2030 is 44 %, significantly higher than the previous NECP which set a target of 35 %.

The above objective shall be specified by sector for which individual binding targets are identified.

The participation of RES in electricity consumption is the main policypriority to achieve the target and the timely and effectiveimplementation of the planned measures is considered necessary.

Priority is therefore given to the energy transformation in the electricity generation sector for which we aim for the share of RES generation in gross electricity consumption to reach 80 % in 2030 (significantly higher than the 61 % set in the existing NECP) and close to 95 % from 2035 onwards.

The target for RES electricity generation in 2030 is 82 % of domestic electricity generation (Table 9), significantly higher than the 67 % set in the previous NECP.

This will gradually make electricity close to zero carbon footprint and play its central role in the green transition of theyard.

The increase in the target is based on the high implementation rates of RES plants in the period 2019-2023, the new RES investments we have in recent years and e. It is estimated that we will have by 2030, but also on the need to meet the electricity demand, which **is growing at a higher pace than** historical trends, thanks to the YIO’s establishment of electromobility, the interconnection of islands (electrification of uses) and the electrificationof thermal uses, mainly through the installation and use of heat pumps.

The binding target for RES participation in the transport sector is set at 29 % for 2030, significantly higher than 19 % of the existing NECP.

E-mobility, biofuels, and non-recyclablefuels of non-biological origin contribute to this target. For the latter, a binding target of 1 % of all fuels in the transport sector is set for 2030. Insteadof things, the plan envisages a significant development of advanced biofuels from suitable biomass feedstocks and in the future mainly from ligno-cellulosic biomass. In the long term, itwill be possible for one third of the fuel needs to come from advanced biofuels and at least 50 % to come from climate-neutral syntheticfuels.

The binding RES development target specifically for heating and cooling is set at 46 % for 2030, higher than 43 % of the previous NECP. Heat pumps will contribute mainly to thisobjective, as they use electricity and ambient heat and solar thermal systems. There is no provision for extending the use of biomass for combustion in city buildings to avoid pollution of air from particulate matter.

The development of the bio-economy is a priority for the NECP. In the shortterm, the aim is to 'green' the gas distributed, i.e. the use of renewable gases as a blend with (fossil) natural gas, thus reducing the carbon footprint of gaseous fuels.

The strategic "greening" option of gaseous fuels, while keeping the use of gaseous fuels in addition to electrification, will require that climate neutral gases cover all exhaust gases in the longterm.

At the same time, the basis is given to the use of a larger proportion of livestock, arableand forest residues and waste for the production of biogas, as well as the development of biogas for the production of biomethane through the installation oflighting mixers.

The aim is to harness the biogas production potential to be injected into the gas grid around 250 million cubic metres and reach one billion cubic metres in 2040.

Table 9 summarises the calculations for RES target indicators as measured by EUROSTAT.

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	2025	2030	2035	2040	2045	2050
RES-Electroproduction Index								

TotalRES switchgear (TWh)	22.6	40.7	35.3	52.7	76.1	110.8	147.7	172.3
Total generation (TWh)	53.9	60.5	58.7	64.6	78.7	112.1	149.4	175.2
RES-heating/cooling index								
Index RES — Heating/cooling	436.7	470.0	668.4	931.3	1014.6	1047.1	1035.0	1058.0
RFNBO (ktoe)	0	0	0	79.8	200.1	605.6	1204.8	1190.1
Solar thermal (ktoe)	308.2	500	574.8	599.6	630.7	632.8	602.3	582.3
Biomass (ktoe)	1702.8	900	893.6	748.8	563.2	600.3	547.7	521
Total RES in Thermal-Labelling/Cooling (ktoe)	2447.7	1870	2136.8	2359.6	2408.6	2885.8	3389.8	3351.3
RES-transport indicator								
Electricity from RES (ktoe)	5.7	86.0	19.4	158.2	378.6	597.5	832.7	973.2
RFNBO (ktoe)	0	0	0.2	23.8	694.9	1360.7	1801.5	2737.9
Biofuels (ktoe)	179.1	380	443.6	524.9	780.7	1063.6	1469.9	1701.2
Total RES afterwards(ktoe)	184.9	466	463.2	706.9	1854.2	3021.8	4104.1	5412.4

Table 9 Calculations for RES indicators

2.2.3.2 RES penetration in electricity generation

This section presents the main conditions for achieving the RES penetration targets for electricity generation by 2030.

The objectives set for the mix of installed RES capacity are consistent withthe connectivity possibilities offered by both the transmission system and the distribution network in Greece, on the basis of the development plans of the competentoperators, approved by the RAERA.

It should be noted that on the basis of the final connection offers to the system and the network granted up to July 2023 for the implementation of new RES projects (approximately 13.6 GW in the system and 2.6 GW in the grid) and the applications submitted to the operators for the issuing of new connection offers (42.6 GW), the annual figuresfor electricity generation from RES up to 2030 are considered realistic and achievable.

Given that network capacity is finite and difficult to develop rapidly at the levels corresponding to the size of RES capacity under theNECP, the planning and implementation of the projects required to increase the capacity of the system and the network to accommodate new RES projects after 2030 will be studied in detail. This analysis will assess risk factors, such as the size of the necessary investments in network infrastructure, spatial and environmental constraints and the maturing times of the necessary system/network projects to support the objectives of the NECP.

In order to implement RES projects, it is necessary to have a support scheme for the provision of operating aid (CEMR/FIP) throughout their operationand also to be able to participate in the electricity market or tocontract bilateral contracts with final consumers.

With regard to RES technologies, the development of both onshore and offshore wind, as well as a balanced development of photovoltaic plants, should be ensured in order to diversify their production profile, with a view to addressing adequacyissues and avoiding an excessive increase in the storage needs of the system.

At the same time, a geographical spread of RES should be achieved in order to reduce as far as possible problems with the simultaneous loss of large amounts of generation capacity in the electricity system.

Table 10 summarises the projections of Greece's targets for installed capacity and electricity generation from RES by technology up to 2050. **Note that targets are not binding and are expected to be finalised before the final submission of the revised NECP.**

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for 2030	2025	2030	2035	2040	2045	2050
Electricity sector								
RES power other than-hydroelectric (GW)	9.3	15.5	14.8	23.5	34.7	46.2	64.4	71.7
Wind	4.7	7.1	6	9.5	14.7	19	27.2	29.2
— of which sea				1.9	6.2	9.8	15.4	17.3
Solar	4.3	7.7	8.2	13.4	18.7	25.4	35.2	40.3
Other RES[28]	0.4	0.7	0.5	0.6	1.3	1.8	2	2.1
Hydroelectric (W) (GW)	3.1	3.7	3.1	3.8	3.8	3.8	3.8	3.9
Electricity storage capacity (GW)	0.7	2.7	3.3	5.3	5.7	11	21.3	24.8
— batteries	0	1.25	1.9	3.1	3.6	8.8	19.1	22.6
— pumped storage	0.7	1.4	1.4	2.2	2.2	2.2	2.2	2.2
Capacity of units with burntgas (GW)	5.3	6.9	6.9	7.7	5.7	5.2	2.8	4.2
Power of solid burntunits (GW)	2.3	0.3	1.5	0	0	0	0	0
Power of units with liquidburnt (GW)	1.7	0.3	1.3	0.7	0.6	0.4	0.4	0.1

28 Includes small hydroylates

Total electricity generation (TWh)	54.7	57.9	58.7	64.6	78.7	112.1	149.4	175.2
— from gaseous fuels (TWh)	22.5	19	16.3	11.7	2.1	1.2	1.6	2.9
— from solid fuels (TWh)	5.3	0	4.8	0	0	0	0	0
— from liquid fuels (TWh)	4.7	0.8	2.4	0.2	0.5	0	0.1	0
— from RES (TWh)	22.2	38.1	35.3	52.7	76.1	110.8	147.7	172.3
Carbon footprint(tCO2/MWh)	0.376	0.115	0.200	0.059	0.011	0.001	0.001	0
Dependence on imports of electricity	6.70 %	7.90 %	3 %	3 %	3 %	3 %	3 %	2 %

Table 10 Summary of NECP projections for the electricity sector

2.2.3.3 Terrestrial wind and photovoltaic parks

The installed capacity of onshore wind and photovoltaic parks is projected to increase by 12 GW by 2030 (from 11.5 GW end of 2023 to 23.5 GW in 2030).

This implies an increase in the target of 8 GW compared to the target set in the existing NECP of 15.5 GW.

The main prerequisites for achieving this objective are:

- Compliance with the operational splitting scheme approved bythe European Commission for RES plants up to 31.12.2025 (State aid SA.60064 (2021/N) – Greece Greek RES and heCHP scheme 2021-2025), which provides for support through competitive tendering proceduresfor the installation:
    - at least 3.250 MW of onshore wind and photovoltaicparks with small installed capacity
    - 200 MW of onshore wind and photovoltaic parks with storage (co-accumulators)
    - 500 MW of onshore wind and photovoltaic parksin specific estuaries (Crete, Cyclades and Evia) with congestion
- The extension of the existing approved support scheme with an increase in the planned capacity for RES plants by at least 2030.
- The extension of the existing approved support scheme by increasing the planned capacity to be auctioned (200 MW) for RES plants with storage.
- Promoting dispersed generation through self-consumption schemes to cover households' energy consumption of electricity as well as the primary, secondary and tertiary sectors.
- Strengthening the role of Renewable Energy Communities andCitizens' Energy Units, with the active

participation of first and second-tier local authorities in the control of RESplants with storage systems to cover part or south of members'energy consumption, the needs of buildings that are locatedor serve the needs of first and second-tier local authorities and energy vulnerable households.

- Supporting the conclusion of long-term bilateral contracts, such as power purchase contracts(PPAS), allowing RES producers **to ensurea stable revenue stream** and enhance the possibility of financingRES and final consumers to have guaranteed and predictable electricity prices in the long term, to benefit from cheaper renewable and non-fossil electricity prices, and to havethe difficulty of acting sustainably. .
- Updating the specific spatial framework for RES, taking into account theneed for penetration of RES plants, the nature and spatial characteristics of the mainland, sea and island areas, as well as the protection and management needs of areas with special environmental, ecological, cultural and local interest and areas with great vulnerability toclimate.

Additional issues contributing to the RES penetration target are:

- Strengthening the electricity grid
- The interconnection of the Non-Interconnected Islands with the continental system

2.2.3.4 Offshore Wind Parks

The development of offshore wind parks (OWFs) is a national strategyas it is expected to strengthen Greece's energy transition plan and contribute to energy security by providing clean and affordable energy to our energy mix. The Greek maritime area is characterised by verygood oil potential with little variability in the year, making it particularly attractive to investors for electricity generation than in otherareas of the Mediterranean, as it favours higher energy efficiency of LAGs.

The installed capacity of offshore wind farms is expected to reach 1.9 GW by 2030. Please note that this objective is not final and is expected to be consolidated before the final submission of the revised version of the NECP.

The HSE projects to be developed in the Greek seas will consist of both fixed bottom and floating projects. HSE projects have a high energy efficiency (high utilisation rate) and the distribution of their production throughout the day makes it possible to limit their participation in grid saturation, reduce conventional generation during evening hours and reduce electricity costs.

As regards the framework for offshore wind farms, Law 4964/2022 (Government Gazette, Series I, No 150) was adopted in July 2022, specifying in detail for the first time the framework for the developmentof HWGs in Greece's maritime space.

The aim of the framework is to ensure strict procedures for selecting LAGsgrowing areas with a view to protecting and safeguarding the marine environment. Thepreliminary design of the regulatory and legal framework should benefit Greece by ensuring a balance between consumers, local communities and the state, while creating the framework for ensuring that investmentsare frozen in Greece.

The chosen regulatory model gives the State, through the EDEYEP S.A., whichis designated as the responsible HSE body, the primary role in the planning and selection of Offshore Wind Parks Development Areas (POAYAP), while the detailed procedures for the siting of the areasare specified, which greatly mitigates the risks and provides the necessaryinvestment security, already at the initial planning stage. The grantingof their rights to research to investors and then to develop HSE projects in these areas will be carried out following a specific evaluation procedure basedon qualitative criteria, while the energy price tenderto be followed at a later stage will guarantee consumer protection. The planning of the electricity transmission network and interconnection costs are constantly optimised and reformed thanks to the regulatory framework, with the necessary provision for HSE projects in ADMIE's plans for interconnection of islands. To this end, the Liaison and Development Committee for the Coordination and Development of LAG projects has been set up and operates, with the aim of speeding up procedures and the effective cooperation and communication of all the relevant bodies involved in shapingthe scope of HSE development projects.

It should be noted that the development of LAGs in Greece requires a challenge that requires the resolution of a number of relevant issues, such as the need to establish the necessary infrastructure (e.g. shipyards, ports), the availability of qualified human resources for such projects, problems in supply chains and the high level ofrapprochement with other areas where large-scale HSE development is taking place internationally.

2.2.3.5 Hydroelectric projects

Realising hydropoweris also a priority, as itis a resource that needs to be exploited where available. To this end, the aim is to complete and operate the large hydropower projects under construction, to exploit the potential of irrigation/water projects and reservoirs, and to further develop the category of small-hydroelectric projects.

The participation of hydropower projects in the domestic electricity mix is considered critical and necessary to achieve the penetration of uncontrolled RES with ahigh share of it.

The total installed capacity of hydropower projects (hydropower projects) is expected to reach 3.800 MW by 2030, from 3.100 MW installed so far.

A prerequisite for achieving the above objective is:

- Completion of the construction and entry into service of the Mesochori Ministry of Gas, witha capacity of 160 MW and of the MEE with an installed capacity of 29 MW.
- The construction and commissioning of other large ECSOs, which are either maturing permits, such as the Acheloos Acheloos with an installed capacity of between 83,6 and 100 MW, or have been delayed due to the need for redesign, such as Agios Nikolaos at the Port of Arachthos with an installed capacity of approximately 140 MW, as well as other hydroelectric plants with a lower capacity.

2.2.3.6 Other RES

For RES technologies29other than wind and photovoltaic technologies and large HPPs, the staggered productioncosts are still comparatively high, the implementation of the projects is cumbersome and time-consuming, and significant competition has not yet developed. The further developmentof these technologies is therefore expected to depend to a significant extent on State aid.

On the basis of the approved aid scheme (SA 60064), the above plants are included in an operating aid scheme outside competitive tendering proceduresuntil 2025, and the objective is to maintain this support schemeat least until 2030.

In addition, taking into account both the new regulatory framework and the investment interest in recent years regarding the exploration and exploitation of high temperaturegeothermal fields, the prospects for the penetration of geothermal energy into the national energy mix are positive both in terms ofthermal energy production (85 MWth in 2021 mainly to meet primary sector needs) and electricity generation, where there is still no equivalent plantin operation in Greece, although it is internationally highly technologically and commercially highlytechnological. The objective by 2030 is to broaden research into geothermal fields and achieve the development of a potential of at least 100 MWe.

2.2.3.7 Storage – Batars

The development of sufficient capacity and storage capacity is aprerequisite for the further penetration of RES into the electricity generation mix.

Electricity storage plants, as stand-alone storage plants, participating in the electricity markets, are expected to lead to a significant increase in the penetration rate of RES production in the country’s energy mix, as they are expected to replace the operation of conventional power plants during peak load hours, using the off-take energy during the lunch hours when the production of photovoltaic plants is maximised

29 Including small hydroylates

(i.e. RES energy that would otherwise probably be discarded)while providing necessary ancillary services to a system dominated by objectivity and variability in generation.

In particular, storage plants participate in the electricitymarkets by helping to smooth the large fluctuations in daily electricity prices, by absorbing RES energy when RES production is higher and/or lowerthan electricity demand and its efficiency during peak hours, undermining the production of expensive conventional gas plants, thereby limiting wholesale electricity market prices.

As a result, storage plants effectively replace expensiveelectricity generated by high-cost plants with low-cost, clean electricityavailable under high RES production conditions, thus facilitatingthe overall integration of RES and reducing cuts in electricity from RES during overgeneration hours.

In addition, electricity storage units participate in the balancing market, providing flexibility and ancillary services to the electricity system, which are essential for the successful integration of large capacity and different stochastic RES technologies into the system, while atthe same time enhancing market soundness, especially in the balancing market, supporting competitive andtransparent price formation and leading to lowerbalancing prices.

In addition, storage plants, when combining their operation with RES plants (e.g. RES plants with an integrated storage unit behind the meter), can alleviate local grid saturation problems, indirectly increasing the system's capacity to connect new RES plants, further enhancing the penetration of RES generation in the energy mix, while at the same time helping to reduce the production of conventional plants during evening peak hours.

They thus replace, to a certain extent, the needs for further local grid reinforcement investments in areas with high energy potential.

The total capacity of battery storage systems is expected to reach a maximum of 3.1 GW by 2030.

The installation of these systems will be promoted through appropriate casting schemes, such as approved scheme SA.64736 whereby individual power plantsmay receive investment and operating aid following participation in a quasi-galistic biddingprocess, as well as Figure SA.60064, which provides for operating aid to an RES plant with a capacity of up to 200 MW combined with an electricity storage unit behind the meter.

On the basis of the current scheme, in June 2023 the first competitive biddingprocess for a capacity of 400 MW of individual shedding plants was carried out, while according to the timetable for conducting the tenders, the next(2th) tendering procedure, with a tender power of 300 MW and a capacity of at least 2 hours, is expected to take place by the end of 2023, followed by anothercompetitive procedure, with a tender power of 300 MW and a shallow capacity of4 hours, at the beginning of 2024.

It should be noted that in order to achieve the objective of installing 3,1GW of power stations by 2030, it is necessary to extend the aid scheme SA.6473630 by stopping the planned capacity in addition to 1 000 MW. To this end, theincrease in the cost of developing storage systems has made it possible to extend the aid scheme for a total capacity exceeding 1 000 MW. However, in addition to the development of individual storage plants, it is necessaryto develop RES stamps combined with electricity storage units.

In order to allow the installation of more RES plants, in particular at the saturated points of the grid, and to further enhance the penetration of RES production in the country's indigenousmix, it is necessary to amend the current support scheme for RES plants (SA.60064) to allow for the granting of aid to RES plants combined with electricity storage units for a capacity of significantly morethan 200 MW.

In addition, the installation of RES plants on home roofs, combined with electricity storage units, is being promoted to cover domestic electricity consumption, with the aim of installing around 150 MW of RES plants with a capacityof up to 10.8 kW each, with integrated storage "behind the meter".

It is worth noting that the planned targets for fluid storage systemsin this draft NECP (i.e. up to 3.1 GW by 2030), which includeboth individual electricity storage plants and storage units combined with RES plants, are not final and will be finalised before the final submission of the revised NECP.

they will be obliged to participate in the electricity markets and enter into Contracts for Differences (CfDs) for a duration of 10 years ensuring their financial viability. Under the scheme competitive procedures for granting incrementaland operating aid to 1 000 MW of storage plants will be carried out. The selected projects will have to be operational by the end of 2025.

The scheme30 provides that electricity storage systems may receive investment and operating support following their participation in a competitive bidding process. The projects

2.2.3.8 Storage – pumped storage

In addition to installing storage systems of short duration, e.g. batteries, storage ofelectricity in pumped storage plants offers the advantagesof being able to store energy with a high capacity (up to 100 GWh), large power (up to 3 GW), capable of delivering electricity for an appropriate period of time (up to 10 hours), with a sufficient efficiency (70 – 85 %), while their basic infrastructure has a long lifetime (more than 80 years).

The total power of pumped storage systems is expectedto reach 2.2 GW by 2030. While pumping has very high domestic added value and reduces dependencies on offshore raw materials, the possibility to further develop it in the coming years (after 2030) will be reviewed in the light of the geomorphological constraints on the development of this technology in the country. GVAwas a prerequisite for achieving the 2030 target:

- The construction and operation of the 680 MW pumping storage station in Amfilochia. 31
- The construction and operation of other pumped storage projects, which are in a mature licensing phase, with a total capacity of approximately 820 MW, from a project pipeline with a total capacity of approximately 2.000 MW, mainly by modifying existinghydroelectric power stations by adding an upstream reservoir. These projects are located atlocations of the River Acheloos (without the need to divert it). For example, the places named Brachonera, Trichonida, Ladonia, Palaiochori.

The exploitation of Greece’s pumped hydropower capacity is of theutmost importance for the reliability and safety of the electricity system, since pumping actsdirectly towards storage with batteries and can, under certain conditions,generate long-term storage, enabling the penetration of variable RES plants to be maximised.

The installation of high-capacity storage stations, such as pumped storage stations, will also enhance the country’s capacity and energy adequacy. High-capacity storage plants also contribute to the storage of excess RES for long periods, i.e. an expected situation under conditions of very high penetration of RES production into the energy mix of the yard, as well as to the provision of back-up and ancillary services to the system.

The31 *project will receive investment aid totalling EUR 250 million from the Recovery and Advertibility Fund in accordance with the approved support scheme (SA 57473).*
The project is in the implementation phase and is expected to become operational in the coming years.

2.2.4 — The development of alternative and climate-neutral gases and liquid fuels

2.2.4.1 Air Fuel Targets Summary

Table 11 presents the summary of the NECP projections for gaseous fuels.

Table 11 View for gaseous fuels

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	2025	2030	2035	2040	2045	2050
Gaseous fuels sector (excluding LPG and coal-derived gases)								
Total gaseous fuel consumption (TWh)	63.4	56.6	49.3	43.5	40.7	59.8	73.9	89.6
— for heat electricity and distribution (TWh)	43.4	36.1	28.2	20.9	6.8	9	9.8	12.3
— in industry, binderand others (TWh)	8.3	5.9	7.2	7.7	7.6	11	10.8	10.4
— in non-energy uses (TWh)	3.5	5.5	4.5	5.3	5.6	5.8	6.1	6.2
— in buildings, agriculture and-after-time (TWh)	8.1	9.1	9.4	9.6	9.6	13	14.2	16
— in synthetic carbonproduction (TWh)			0	0	11.1	20.9	32.9	44.7
Total natural gasconsumption (TWh)	63.4	56.6	49.3	36.9	19.3	16.3	7	7.8

2.2.4.2 Strategy for gas transported and distributed

The main strategic option of the NECP is to gradually reduce the consumption and carbon footprint of gaseous fuels.

The penetration of RES in electricity generation and the substitution of naturalgas by electricity in the heating and industrial sectors is leading to agradual reduction in the overall consumption of gaseous fuels. At the same time, mobile natural gas will be transformed into a blend with renewable gases (see next sections).

Gas demandpeaked in Greece in 2021 (6,08 bcm) and has been on a downwardtrend since then: 4,88 bcm in 2022 (-19.7 %), while in the first 6 months of 2023 domestic demand fell by -22.2 % compared to the same period in 2022, and 80.6 % of this declineis on the electricity generation side. Electricity generation accounted for 73.5 % of annual gas consumption in Greece in 2022. This fell to 63.5 % in the first 6 months of 2023. According to this draft revision of the NECP, gas consumption in Greece will fall to 36.9 TWh/year (or 3,2 bcm/year) by 2030 and 7.8 TWh/year (or 0,7 bcm/year) by 2050. However, gaseous fuel consumption isestimated at 43.5 TWh/year in 2030 and 89.6 TWh/year in 2050, the difference being due to the use of renewable gases: biomethane, hydrogen. For the latter,consumption sectors and distribution channels are very likely to diversify asit will be mainly consumed in transport, industry and for the production of synthetic fuels in pure form rather than as a blend with natural gas.

Figure 2 The Greek natural gas transmission system

However, the natural gas transported through the NNGS is not only domestically caught, but also transit to other Balkan and SEE countries. Indeed, in 2022, of the 7,5 bcm transported in the Greek Transmission System, 2,6 bcm (35 % of the total) concerned transit. In 1,[the] half of 2023, out of the total number of 2,9 bcm travelled, 0,85 bcm (29.4 %) related totransients. Gas transit is expected to increase further following the fulldrawing of the new LNG floating stations, taking into account the need for lignite removal on the one hand and a release from the Russian gas pipeline on the other. For the same reason, DESFA is updating the capacity of the Transmission System by installing new compression stations, with a view to increasing the capacity oftransit by 2026 to 8,5 bcm/yr (from 3,1 bcm/yr today). A new interconnector is also under construction to connect the gas systems of Greece and North Macedonia, with the potential for further expansion to Kosovo and Serbia. The transit of natural gas, in additionto the STRATH objectives of regional security of supply it serves, will also contribute to maintaining relative stability of gas transmission tariffs during the energy transition period.

Thus, in order to contain the rise in the tariff for the use of thesystem using natural gas as a result of inverted investments and at the same time a reduction in the volume absorbed, only the absolutely necessary investments are promoted in addition to the natural gasinfrastructure, which will be needed during theenergy transition. This includes investments in the supply of newgas power plants that will be needed to address the variability of RES at regional level, until there is sufficient deploymentof "green" energy storage systems, as well as to diversify sources of supply and ensure security of gas supply at-rainwater level. In this context:

- As of early 2024, the new FSRU station at A Alexandroupolis, which is underconstruction, is expected to be operational
- A Final Investment Decision is expected for another FSRU plant in Agios Theodoros Korinthia, near the existing Revithoussa LNG plant. Estimated completion by the end of 2025/αρχές 2026. This plant will enhance the security of supply to Greece and to the entire region of the Athens Euro, in view of the objective of fully relieving the entire region of Russian gas supply routes.

The above plants, in combination with the new compressor stations under construction by DESFA and the planned upgrades of the Metros System, will create an appropriate infrastructure capacity margin and instead of being able toachieve at the same time:

- The full freedom of Greece to procure gas from any source depending on its commercial and strategic interests.
- The secure supply of Greece in all cases of exceptional livingconditions or problems in an import infrastructure.
- LNG transit to other Balkan (and/or northernmost) countries and Greece’s contribution to regional security of supply and independence from Russian gas supplies
- Balancing the electricity system in case RES do not generate enough

Additional LNG floating stations have been proposed as well as other reinforcements to the Transmission System. These will be considered in the context of their necessity to accommodate possible additional transit needs as they will evolve, given that, according to gas market forecasts, no additional gas import infrastructurewill be available for Greece alone.

For natural gas distribution networks, taking into account that natural gas infrastructure isno longer eligible for co-financing by Community programmes other than those relating to lignite-fired areas, and the fact that the uses currently covered by gas distributed will gradually be electrified, there is a need to monitor and evaluate the extensions of distribution infrastructure, in order to avoid a disproportionate increase in tariffs for the use of distributioninfrastructure. For this reason, the construction of networks in new remote areas, in which the following conditions are met: (a) the contract for the construction of distribution networks under already approved development programmes has not been signed to date, and (b) they cannotbe fed with the future limited expansion of existing natural gas transmission or distribution networks at the discretion of the RAAEY, only to the extent that the gas distributed will be locally produced biomethane. An exception to this rule may be applied in the regions of Epirus, WestMacedo, Central Macedonia, Eastern Macedonia-Thrace due to climatic conditions.

A particular use of natural gas that can be developed duringthe nascent transition and contribute to its objectives is the developmentof small-scale LNG. Thetank tank rescue station has already been completed in Revythousa, while under construction, with expected completion in the second half of 2025, the LNG quay for LNG bunkering (either for own use or for transport to other consumption centres) is currently under construction. LNG, which is transported on a small scale by road tankers or boats, can be substituted-for oil by natural gas in cases of consumers remote fromthe gas network (industry, local distribution networks). In addition, shipping (in particular coastal and cruise shipping) can use LNG as propulsion fuel until synthetic green fuels mature, reducing CO2 and other pollutant emissions.

2.2.4.3 Development of biomethane

Total biota consumption Methane (TWh)			2.1	3.3	4.5	9.6	9.7
% blending of biomethane in gas distributed			10.8 %	11.3 %	15.4 %	18.6 %	20.4 %

Table 12 Development of biomethane sector

According to the draft revised NECP, total biomethane production is expected to reach 2.1 TWh by the end of 2030 and 3.3 TWh by 2035.

Biomethane is a renewable gas resulting mainly from the upscalingof biogas. Biogas is derived from organic materials such as human or animal waste, food waste, distillery waste or agricultural materials. As the carbon of this material has just been taken from the atmosphere and belongs to the short carbon cycle, biogas and biomethane are considered renewable fuels. Biowith sulphur has similar properties to natural gas and can therefore be transported through the available infrastructure. It can also be used asburning for vehicles and generally for all purposes also used for natural gas.

Biomethane can be injected and distributed through the natural gas network after it has been compressed to pipeline pressure and odorisation, usually tetrahydrothiophene, has been added to allow for the detection of leaks along the network.

Biomethane can have a significant additional effect on the achievementof the European Union's environment. In order to achieve the European Commission's environmental yards for 2030 and the European Commission's goal of achieving a net-zero net zero economy by 2050, multiple climate solutions must be pursued in parallel. In addition, the production of biomethane, combined with the conversion of the residue into compost, is an integrated-method of bio-waste management in line with the principles of the circular economy and sustainability.

The growth of biomethane in recent years has risen considerably, due to the better energy efficiency achieved by burning it for heating instead of converting it into electricity, where other REScan also be used. According to the European Biogas Association (EBA) in 2020, there-were 20.000 biogas plants in Europe, 1.000 of which upgraded and burned biomethane in the natural gas network. Over the last decade, biogas and biomethane production in the EU has increased thanks tothe promotion of renewable energy policies. However, between 2016 and 2020,the treatment of energy from biogas stagnated and production from biomethanewas increasing. This path is shown in the picture below.

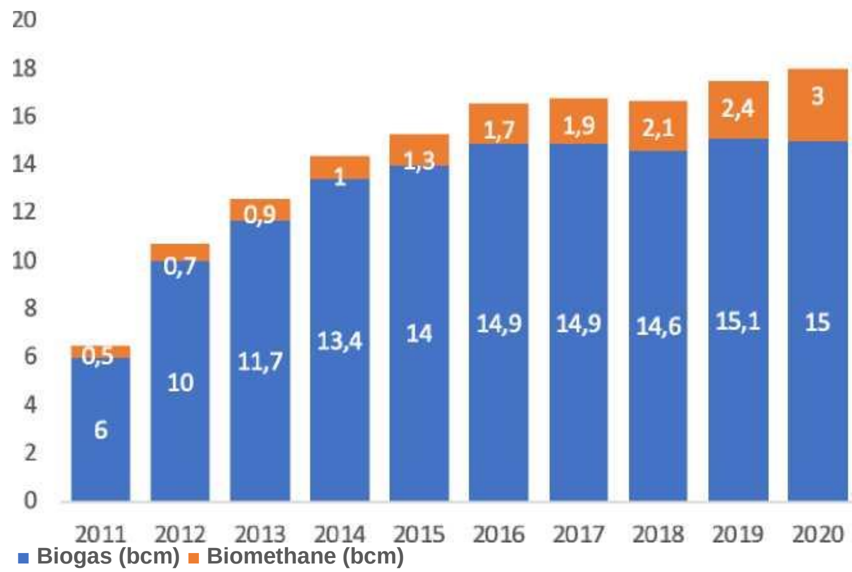


Figure 3: Energy production in Europe from biogas and biomethane from 2011 to 2020[32]

Greek State of Art

Today, 99 biogas power plants are in operation with a totalabandoned capacity of 116 MWe. There is no production of biomethane. The categories of biomass usedare waste from livestock farms (cattle, pig farms, sheep and goats, poultry), agricultural residues (from winter cereals, e.g. durum and common wheat, oats, rye, vetch, triticale),agro-industrial waste, catering waste (e.g. from restaurants) and organic municipal waste. The above raw materials can be used as feedstocks for the production of biomethane/biomethane and are in line with Annex XI of the amended Energy and Climate Directive (RED II).

<u>Production potential of biomethane in Greece</u>

According to a study by the CCI, the total *theoretical* biomass potential from livestock manure, cereal straw, agro-industrial waste and the organic fraction of municipal solid waste is

32 G. Cancian, 'www.energigas.se,' 2022. [Electronic]. Available: https://www.energigas.se/media/5ounuloh/1_1_gilulia-cancian_repowereu-finale-gasdagarna-may2022.pdf. [Accessed 17 November 2022].

28.209.768 tonnes/year, with a total biomethane potential of 1,148 billion m^3 or 11.069 TWh.

Table 13: Theoretical biomass potential and biomethane energy content per feedstock in Greece[33]

Type of biomass	Biomass	Energy content of biomethane	
	Tonnes/year	m³/year	MWh/year
Livestock	23.969.935	726.846.217	7.008.106
Agricultural	1.002.930	242.685.210	2.339.922
Agro-industrial	1.150.815	16.287.673	157.042
Urban solids fromwastes	2.086.089	162.237.088	1.564.258
Total	**28.209.769**	**1.148.056.188**	**11.069.328**

A characteristic of Greek biomass production is that it is produced by small and scattered plants compared to the rest of Europe. This creates difficulties in itsdeliberation and leads to a low degree of actual exploitation of theoretical potential. According to the CCI, the maximum actual utilisation rate of the theoretical potentialcannot be considered to be more than 30 %3334. The maximum production of biomethaneis therefore at a level of 3.3 TWh/yr. While according to this draft of the revised NECP, biomethane in 2030 will be 2.1 TWh/year.

It should be noted that the estimated potential refers to the anaerobicmethod only, which is the most mature and lowest cost process.

In the future, it is envisaged to reduce costs and develop and produce through the process of gasification of solid biomass and methanisation of the resulting synthesis gas, which can provide additional amounts of biomethane.

2.2.4.4 Green hydrogen deployment

In the current period, significant amounts of 'grey' hydrogen produced from natural gas are consumed in Greece, mainly by refineries and the fertiliser industry. According to the latest data from the European Rogen YObservatory, around 326.000 tonnes of grey hydrogen were consumed in Greece in 2022, resulting in an emission of around 2,9 million tonnes of CO_2. Replacing'grey' hydrogen with 'blue' or 'green' hydrogen (the endproduced from renewable energy sources through electrolysis) will drastically contribute to the reduction of greenhouse gas emissions by being aligned with national decarbonisation objectives. In addition, green hydrogen can make a significant contribution to reducing greenhouse gas emissions in sectors where this is difficult to achieve, such as aviation, maritimetransport and specific industrial

33 Christos Zafiris, CCA "biomethane in Greece: Potential and Perspective', Thessarest iki 23.5.2023
34 Christos Zafiris, CCA "biomethane in Greece: Potential and Perspective', Thessarest iki 23.5.2023

activities.

As regards green hydrogen, to date, two small researchunits and a small commercial electrolytic hydrogen production plant have been built, as well as some pilot/commercial hydrogen production projects and plansto set up hydrogen refuelling stations on a pilot commercial basis claiming funding from European programmes.

Globally, 95 million tonnes of hydrogen were consumed in 2022, almost entirely produced from fossil fuels. Most of this wasused in industrial processes, followed by refinery processes. According to the International Energy Agency (IEA), the amount of ‘conventional’ hydrogen produced from fossil fuels will remain practically stable until 2030. Inthe coming years, the IEA envisages a significant increase in theuptake of ‘new’ hydrogen (e.g. renewable orlow-carbon hydrogen), including other uses such as transport, accounting for 40 % of global hydrogen consumption by 2030.

The European Hydrogen Strategy, adopted by the European Commission in July 2020, sets the framework for the development of green hydrogen within the European Union. Under the REPowerEU initiative, communicatedin May 2022, the objectives of this strategy have been further strengthened. Renewable hydrogen consumption within the European Union is projected to reacha total of 20 million tonnes by 2030, of which 10 million tonnes will be produced in the EU and 10 million tonnes imported from third countries.

In addition, the Fit-for-55 legislative package proposed by the EuropeanCommission in July 2021 contains a large number of provisionson the development of renewable and low-carbon hydrogen. The newvision of the Renewable Sources Directive includes a new binding target for industry by 2030 that 42 % of the hydrogen used will be renewable. This target will be raised to 60 % by 2035. It also includes a minimum binding consumption target for renewable fuels of non-biological origin (RFNBO) in transport of 1 %. In particular, for the aviation and coastal shipping sectors, this target is projected to be increased, reaching 1.2 %.

In June 2023, the two Delegated Acts were adopted in relation tonew hydrogen, as provided for in the Renewable Sources Directive. Delegated Regulation (EC) No 2023/1184 lays down the methodology anddetailed rules for renewable electricity used for the production of RFNBOs, while Delegated Regulation (EC) No 2023/1185 describes the methodologyfor calculating greenhouse gas savings due to the use of RFNBOs. The provisions contained in the two Delegated Acts provide the basis for the creation of a certification scheme for renewable hydrogen within the European Union.

Regulation 2023/1804 on Alternative Fuels Infrastructure has replaced the previous

Alternative Fuel Infrastructure Directive. The Regulation sets minimum targetsfor the deployment of hydrogen gas supply infrastructure under pressure for the road transport sector (see Chapter 2.2.1).

The FuelEU Maritime Regulation 2023/1805 and the new ReFuelEU Aviation Regulation set the targets for the introduction of renewable fuels in the other transportsectors (see section 3.3.3). Renewable liquid fuels in these sectors will require a proportionate scale-up of green hydrogen production.

In December 2021, the European Commission, through the Hydrogen and Decarbonised Gas Market Package, proposed to revise the rules of the European gas market. This package includes the revision of the existing Gas Market Directive and the existing Gas Market Regulation, and will set the framework for the development and regulation of a common market for hydrogen within the European Union. This framework also includes detailed proposals on the regulation of hydrogen infrastructure.

The European Union has also allocated significant amounts of funding forrenewable hydrogen. These amounts include funding under the Clean Hydrogen Partnership, Horizon Europe and the Innovation Fund. For Greece, co-financing has already been approved by Horizon Europe and the Clean Hydrogen Partnership to create a small hydrogen valley in Corinth (Trieres project). This project is linked to the EPHYRA project, which will demonstrate for the first time on an industrial scale a hydrogen production facility (30 MW) from renewable energy sources.

In addition, in March 2023, the European Commission notified the European Hydrogen Bank. This new mechanism will provide chromaticand technical support for renewable hydrogen production in Europe (through subsidies from the Innovation Fund), as well as for imports of-renewable hydrogen from third countries.

The above proposals on hydrogen, which are included in the European Monosia, will have to be transposed into Greek legislation accordingly within the next few years. In March 2023, Law 5037/2023 was adopted, which introduced the definition of green hydrogen and transposed the REDII provisions. The National Regulation on the installation of hydrogen refuelling stations (OG B 2570/20.04.2023) has also been adopted and the green hydrogen certification body has been designated.

The development of hydrogen in Greece will be based on the following pillars:

- The needs for green hydrogen will be met by domestic production, given Greece's RES potential. Production will take place in locationsthat ensure optimisation of total costs, taking into account the cost of transporting clean hydrogen to consumption points.

- Hydrogen will be prioritised towards non-electrified use sectors such as heavy road transport, waterand aviation, as well as certain industrial applications (steel industry, cement, refineries, ammonia production, etc.).
- The use of renewable liquids pluspositive fuels of biological or non-biological origin appears to prevail in shipping and aviation. As this sector is still under research with a view to the technical and, above all, economic, maturation of the technologies concerned, the drastic reduction in the carbon footprint of these sectors is expected to be achieved after 2030.
- In the heavy road transport sector, the solution of hydrogen gas fuel cells can be applied. At the same time, thebattery industry is carrying out research to address the challenge of heavy-duty vehicles, competing with the hydrogen solution. In this context and in line with EU legislation (AFIR), hydrogen stations will be set up, in principle on a pilot basis, and/or to serve in particular heavy transport (at least 26 in total by 2030), and after 2030 they are expected to be further extended, analogous to technological developments.
- In the field of industrial applications that cannot be electrifieddirectly, relevant applied research into hydrogen-based solutions will be encouraged. At the same time, and while research evolves, the reduction of the carbon footprint of these sectors will be achieved through CO_2 capture and storage (see next section).
- Furthermore, as already mentioned, hydrogen is still awaiting technical and economic maturity, in particular for maritime, aviation and rigidindustrial applications (such as steel production). This requires the installation of additional RES, since the production of hydrogen receivesa large amount of 'green' electricity, while the productionof fuels requires additional huge amounts of cleanelectricity. For this reason, the draft NECP includes the installation of 3 GWof renewables for hydrogen production by 2030. Due to the expected maturity of the technology, an exponential growth in the development ofthe hydrate and its derivatives is predicted after 2035.

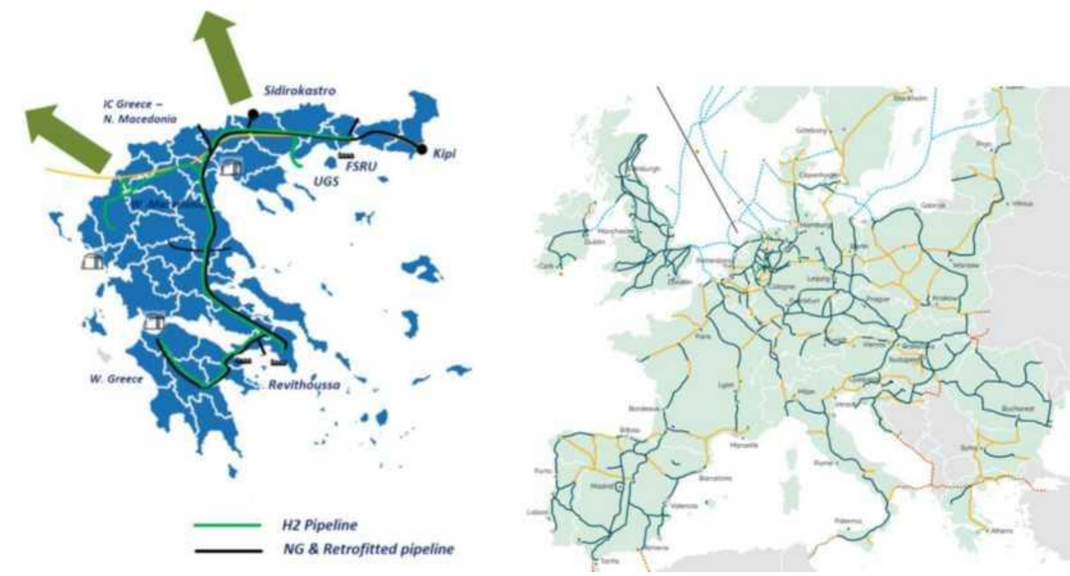
The final targets for hydrogen production are currently under investigation. Solong as the total green hydrogen production for 2030 is estimated to be at least 0.92 TWh, corresponding to a capacity of approximately 300 MW installed electrolysissystems, the aim being to pool appropriate resources together with the creation of a hydrogen-absorbing chainin uses that cannot be electrified, in order to further accelerate hydrogen production by 2030.

Total green hydrogen consumption is estimated at 63.6 TWh/year by 2050, but most (around 70 %) is estimated to be consumed for incidental treatmentof synthetic hydrocarbons for transport use (see next sections).

Hydrogen transport infrastructure

As regards hydrogen transport infrastructure, it is true that pipeline transport is the safest and cheapest solution for large quantities or even longstops. There is already planning by DESFA for the development of a networkof pipelines from closed hydrogen transport, which will unite the estimated maindemand centres in Greece, enabling imports and exports of green hydrogen to and from neighbouring countries.

Figure 4: Planned hydrogen transport networks in Greece and Europe[35]



This core hydrogen transmission network in Greece has been integrated into the network of the European Hydrogen Backbone initiative of European NetworkOperators. With this in mind, Greece has the potential to act as a hub in the wider region to import green hydrogen from North Africa and the Middle East and export it to other European countries.

Despite this preliminary design on paper, it is clear that further maturation and implementation of such infrastructure is premature before the form in which hydrogen will be used in the end uses (gas or liquid derivatives) and the topology of production and use. Technology in principle and demand, on the other hand, together with cost analyses of alternatives (transport of hydrogen gas versus transport of liquid derivatives versus on-site hydrogen production, possibly with imported renewable electricity), willguide developments in this area.

[35] DESFA, European Hydrogen Backbone

2.2.4.5 carbon dioxide capture and use or storage (CCUS- Carbon Capture and Usage or Storage)

NECP (Apr. 2023)	2021 (estimate)	NECP 2019 for 2030	Central scenario					
			2025	2030	2035	2040	2045	2050
Extraction of CO2 from pelletsteam (thousand tonnes CO2/έτος)			0	0	66	2474	3203	5379
Capture of CO2 fromconductor electrode (thousand tonnes			0	0	0	1077	1130	1743
Capture of CO2 from industrial processes (thousand tonnes			0	— —	932	3287	3447	3653
Geological storage ofCO2 (thousand tonnes CO2/έτος)			0	[36]	— —	4363	4577	5395
Use of CO2 for synthetic cans (thousand tonnes CO2/έτος)			0	0	1996	3741	5733	7853
Incorporation of CO2 in materials (thousand tonnes CO2/έτος)			0	0	6	89	230	310

Table 14 Carbon Capture and Usage or Storage (CCUS- Carbon Capture and Usage or Storage) projections

Carbon sequestration from industry exhaust/waste gases is the fastest way to reduce the carbon footprint of this sector, at least untilthe development of alternative technologies based on RES and hydrogen. Captured CO_2 may be used for synthesis of synthetic fuels up to

[36] on the basis of the plan to facilitate CO2 capture investments and to develop a CO2storage facility in Prinos, Kavala, the figures in the table for 2030 and 2035 will be reviewed, taking into account the timetable for the implementation of the Innovation Fund from which these projects will be financed.

2040 in line with EU policy (to reduce the use of new fossil fuels in transport). It can also be stored in watertight geological formations.

In this context, the investment facility for CO2 capture emitted by industrial installations, mainly refineries and cement factories, is being considered. Two projects have already been approved for co-financing by the Innovation Fund: IRIS project for CO2 capture at the hydrogen production plant of a refinery in Corinth, and an IFESTOS project for CO2 capture in a cement plant in Viotia. At the same time, the first CO2 storage plant in Prino, Kavala, is already covered by the Recovery and Resilience Fund for co-financing. The plantwill have a capacity to absorb 2,5 million tonnes of CO2 per year in full operation. It is estimated that the first phase (for a capacity of around 1 million tonnes per year) will be completed by the end of 2025 and the second phase (full capacity) by the end of 2027. The completion of the relevant token and regulatory framework for capture, transport, use and storage of CO2 is also progressing**. Responsibility for supervising the construction and operation of these projects**has also been entrusted to a specialised public-limited company (EDEYEP). **.**

Finally, it is worth noting that Carbon Capture and Storage (CCS) technologies are expected to be used in the maritime sector as well. Recent decisions by the International Maritime Organisation (IMO/MEPC 80, July 2023) on binding absolute greenhouse gas (GHG) emission reduction targets, including the 2050 Maritime Decarbonisation (net zero) target and the indicative interim but ambitious absolute GHG emission reduction targets in 2030 and 2040 make carbon capture technology(CCS) an important solution for shipping. CCS technology has already been included in the IMO's sustainable pathways and is expected to be one ofthe ship-owners' compliance options for achieving the objectives of combatingshipping. In addition, it is appropriate to take into account that captured CO2 from the capture of gaseous emissions using CCS onboard technology may be used asa feedstock, e.g. for the production of alternative fuels with recycledcarbon, e.g. blue methanol.

2.2.4.6 Summary of Liquid Fuel Targets

The NECP projections for liquid fuels are summarised below:

Table 15: NECP projections for liquid fuels

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	Central scenario					
			2025	2030	2035	2040	2045	2050
Liquid fuel sector								
Total Liquid Fuel Consumption (EP)	13.0	11.8	12.8	10.8	8.4	5.8	4.2	3.5
— for electricity and heat distribution (electricity)	1.1	0.2	0.5	0.1	0.1	0.0	0.0	0.0
— in industry, refineries etc. (Million tip)	1.9	1.7	1.8	1.6	0.9	0.3	0.1	0.1
— non-energy uses (EEA)	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
— in buildings and agriculture	1.5	0.2	1.3	0.8	0.3	0.1	0.0	0.0
— transport (Euratom)	8.1	9.3	8.9	8.1	7.2	5.9	4.9	4.2
Overall consumption petroleum products (Million tip)	13.0	10.0	12.3	10.2	7.1	3.8	1.5	0.0
Total consumption of syntheticpetroleum products (Extract)			0.0	0.0	0.7	1.2	1.4	2.1
Overall consumption Bio-fuels (Million tip)		0.4	0.5	0.5	0.6	0.9	1.3	1.3
Carbon footprint of liquids in active uses (tCO2/τιπ)	3.21	2.72	3.09	3.05	2.69	1.97	0.91	— — 0.49
Import dependency of gaseous fuels	86 %	86 %	95 %	94 %	87 %	75 %	62 %	35 %

The strategic objective of the NECP is to gradually reduce the consumption and carbon footprint of liquid fuels.

The total consumption of liquid petroleum fuels (2021 data) is about 13,0 Eq/year (or 268 kb/d), of which 62.7 % is used in transport (44.2 % in domestic and 18.5 % in international), 11.9 % for heating buildings, 8.1 % in electricity generation on non-interconnected islands and the remaining 17.3 % is used in industry. For the islands, there is an extensive programme of electricityconnections between most islands and the mainland system, which is expected to be completed by the end of 2029, as well as a RES basedenergy autonomy programme for the very small islands. Thus, from 1-1-2030, the need to use oil to power the islands will disappear in practice. For buildings, the National Climate Law (Government Gazette, Series I, No 105/27-5-2022) provides for a ban onthe sale and installation of hot heating oil from 1-1-2025, and allows from 1-1-2030 thesale only of domestic heating oil containing at least 30 % by volume of renewable liquid fuels. The use of liquid fossil fuels will be slowly scaled down asthis goes hand in hand with the development and economic maturation of new technologies and refuelling infrastructure.

According to this NECP, the total consumption of liquid petroleumfuels is mixed to 10.2 %/year by 2030 and to zero by 2050. The total liquid fuels, including renewable fuels, tobe consumed are estimated at 10,8 yearby 2030 and 3,5 June/year by 2050, indicating the significant penetration of electricity in transport and building heating.

2.2.4.7 Conventional liquid biofuels

Conventional liquid biofuels are already used in Greece in the form of biodiesel with a mandatory blending quota of 7 % v/v in road transport oil and bioethanol/bioether with a mandatory 3.3 % blending quotain petrol, equivalent to about 5 % v/v. Biodiesel is almost entirely producedin Greece in 18 plants with oil-fired energy crops (rapeseed, sunflower, soya, cotton seed) and oily waste (used frying oil) (FAME). Bioethanol is produced by fermentation of sugars/starch canals oflime (sugar beet, sugar cane, cereals, maize) and is imported. Before mixing, however, it is mostly converted into ethers in order to reduce the evaporation point in the refineries.

The production/consumption of conventional liquid biofuels is not further developed in order not to create a problem in the supply of food andfeed, in line with EU policy. The above limit on conventional biofuels as a percentage of transport fuels is maintained at 1.7 % throughout the energy after-market, indicating a gradual reduction in their production in absolute terms.

2.2.4.8 Advanced Liquid Biofuels

Advanced biofuels are produced by hydrogenation of vegetable oils or other biological fats such as animal fat, used cooking oil and tall oil (paper industry residue) (international terminology: HEFA-Hydroprocessed Esters and Fatty Acids or HVO- Hydrotreated Vegetable Oils). For this purpose, hydrogen "blue" or "pulp" is used and organic oily/grease waste is used as carbon feedstock in compliancewith Annex XI of the amended Energy and Climate Directive (RED II). This chemical process first removes the content of the raw material andthen decomposes and isomerisation of organic molecules, with the final product being diesel (advanced biodiesel) or kerosene (SAF-Sustainable Aviation Fuel).

Gasification technologies for woody residues andliquid fuels using green hydrogen are also under investigation through the Fischer- Tropsch chemical process that achieves the catalytic conversion of a mixture of CO (produced fromgasification) and H2 into liquid fuels (diesel, gasoline, kerosene) (BtL- Biomass-to-Liquids). One of the liquid fuels also considered as a substitute for petrol, which can be produced with similar technologies, is methanol (biomethanol).

There is currently no production of advanced biofuels in Greece. However, the contribution of advanced biofuels is expected to reach 2.4 % of transport fuels by 2030 and 17 % by 2040. The main constraint isthe pre-material availability and production costs, which, however, have a downward trend. Advanced liquid biofuels will mainly be used in the transport sector as a substitute for conventional biofuels.

2.2.4.9 RFNBO- Renewable Fuels of non-biological Origin

These fuels are produced using, as a carbon source, CO_2 captured from waste gases/flue gases of specific industrial processes (until 2040 in accordance with EU policy), from biomass or from the atmosphere (DAC- Direct Air Capture), and, as a source of hydrogen, 'green' hydrogen. They are also called e-fuels dueto the use of large quantities of electricity to produce green hydrogenand capture carbon dioxide from the air. Synthesis is made using Fischer-Tropsch catalytic chemical processes or methanol synthesis, from synthesis gas (mixture CO, CO2, H2). They are technologies under development, mainly in terms of energy captureand production costs.

One of these fuels is ammonia. It is produced in renewable form from air nitrogen and green hydrogen with Haber-Bosch catalytic reaction. Under investigation – the use of ammonia for propulsion of ships is identified. Another alternative considered for ship propulsion is the use of methanol (of biological origin or non-biological origin).

There is currently no production or use of renewable fuels of non-biological origin in Greece. However, it is projected to reach 1 % of transport fuels by 2030 and 23 % by 2040. The main uncertainty is the technical, and above alleco-friendly, optimisation of the technologies concerned.

2.3 OBJECTIVES AND TARGETS IN THE FIELD OF ENERGY EFFICIENCY — OF THE

2.3.1 Summary of energy efficiency targets

Improving energy efficiency is a key horizontal priority in thecountry's economic transition, and it is the fundamental pillar on which all other energy policies need to be designed to achieve ambitiousenergy and climate objectives. This NECP **sets a target of no more than 15,4 final energy consumption in 2030, which is 7 % compared tothe target of the previous NECP for the same year (16,5 June). Please note that primary energy consumption is expected to reach 18,2 Mtoe in 2030, a decrease of 11 % compared to the target set in the previous NECP**.

NECP	Statistics					Projections	
	2021	2025	2030	2035	2040	2045	2050
Gross NA-Domestic Everything slurry (million tip)	21.1	20.9	19.1	19	20.5	21.7	23
Primary Energy Consumption (million tips)	20.3	20.1	18.2	18	19.5	20.6	22
Non-consumption energy uses (million) Toe)	0.7	0.8	0.9	0.9	1	1	1
Gross TE total consumption (million tips)	15.2	16.6	15.4	13.7	12.7	12	11.5

** Note: Calculations compatible with the EUROSTAT standard "Europe 2020-2030"*

Table 16 Energy efficiency improvement projections

The achievement of energy savings, which will result from improved energy efficiency, has a direct impact on the way energy is consumed,the technology used, the energy needs of consumers, and has a key contribution to improving the competitiveness of each industry.

The target for final energy savings from new actions per year, to be achieved in the period 2021-2030 under Article 7 of the **Energy Efficiency Route, was estimated at a higher rate of cumulative energy savings of 30** % than in the previous NECP. It should be noted that part of the cumulative energy savings target will be achieved in households affected by energy poverty in accordance with the provisions of the revised Energy Efficiency Directive.

In addition**, an annual energy upgrading target of 3 % of the total NWW of** the floor of heated and/or cooled public buildings is set.

Similarly, according to the provisions of Article 16 of the Climate Law (Law 4936/2022 (Government Gazette, Series I, No 105/27-05-2022)), local authorities are required to-implement municipal plans to reduce net greenhouse gas emissions in order to **achieve a target of at least 10 % for 2025 and 30 % for 2030 compared to the base year** 2019. This obligation relates to the existingproverse that helped to overcome the energy crisis and concerned the entire state and localgovernment with regard to the obligation to reduce electricity consumption by 10 % in 2022 compared to 2019 for the same period (Ministerial Decision No ΥΠΕΝ/Ν-ΠΕΑ/68315/502/2022 (Government Gazette, Series II, No 3424, 02-07-2022)).

Continued improvement of energy efficiency in all sectors is the second, just as important as RES, which underpins the green energy transition. Therefore, achieving the target of maintaining final consumption of energyin 2030 at the level of 2021 requires targeted energy-saving actions to be implemented in the buildings sector, i.e. dwellings and buildings under-occupation. This sector needs to reduce final consumption in 2030 by about 15 % compared to that in 2021 to compensate for the expected increasein energy consumption of the industry and transport sectors.

Equally important are the contribution from the replacement of appliances with lower-efficiency technologies, the energy improvement of lighting, especially in the public sector and street lighting, and the acceleration and expansion of energy upgrading of public sector buildings.

The achievement of the above objectives is ensured by implementing **theEnergy Efficiency First principle, prioritising the choice of the** most efficient policy measures while leading to multiple benefits in all final consumption sectors, such as reducing energy costs, improving comfort conditions in buildings, increasing productivity of workers, increasing domestic value added and employment and improving business competitiveness.

2.3.2 Energy efficiency in the building sector

The table below shows the objectives of the NECP for the building sector:

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	Central scenario					
			2025	2030	2035	2040	2045	2050
Dwellings Sector								
Annual percentageof energyupgraded beans	0.8 %	1.0 %	1.0 %	1.4 %	1.7 %	1.5 %	1.6 %	1.7 %
Average percentage of hexathos — breakdown due toactivity	34 %	70 %	49 %	76 %	69 %	61 %	51 %	37 %
% of total dwellings with extensive active,upgraded	7.0 %	16.0 %	12.0 %	19.0 %	25.0 %	31.0 %	37.0 %	43.0 %
Average housing-consumption per square metre (kWh/m²)	135	131	128	112	101	98	94	90
% of total dwellings with heat pumps for heating	8.0 %	7.0 %	12.0 %	17.0 %	34.0 %	53.0 %	71.0 %	91.0 %

Share (%) ofelectricity in residential energy consumption	36 %	47 %	38 %	47 %	53 %	56 %	59 %	61 %
Carbon footprint of energy in dwellings (tCO2/toe)	1.11	0.69	1	0.69	0.29	0.1	0.01	0.01
Building Services Sector								
Annual percentage of energy upgradedservice buildings	0.4 %	0.6 %	0.6 %	0.8 %	0.7 %	0.6 %	0.6 %	0.6 %
% of newly built and active upgraded GoI of services	40 %	40 %	47 %	53 %	60 %	66 %	72 %	78 %
% of service buildings with heat pumps for heating	55 %	60 %	65 %	69 %	76 %	84 %	89 %	90 %
Energy per unit of added-value (toe/MEUR transaction)	16.2	14.8	15.3	14.3	12.7	11	9.8	8.8
Carbon footprint of energy in services (tCO2/toe)	0.6	0.22	0.66	0.49	0.19	0.04	0	0

Table 17 NECP objectives for the building sector

Given that the need for energy upgrading of the existing building stockis undeniable, it is necessary to set a **central target for the renovation of the building stock** by 2030, contributing significantly to the radical overhaulof the obsolete building stock while giving a significant boost to the construction sector through investments with high added value.

The annual share of residential buildings, which will be energy upgraded, will increase to 1.4 % in 2030 (corresponding to ~ 79 thousand buildings per year) from 0.8 % today (corresponding to ~ 47 thousand buildings per year) leading ultimately to the energy renovation of 19 % of-residential buildings. The renovation rate is expected to increase to 1.7 % in 2050, contributing-overall to the energy upgrading of 43 % of residential buildings.

Accordingly, the renovation rate of tertiary sector buildings will increase annually to double to 0.8 % in 2030 compared to today improving the ageingefficiency of 53 % of total buildings. The renovation rate is expectedto be high by 2050 ensuring the energy upgrading of 78 % of tertiary sector buildings as a whole.

It is worth mentioning that the rate of construction of new buildings is expected to increase from 0.18 % of the building stock in 2030 to 0.27 % in 2050, making a major contribution to improving the energy performance of the building sector and reducing thecarbon footprint of the building stock.

Key measures contributing to the energy efficiency objective

With this in mind, renovation programmes have already beenimplemented. **In the residential sector**, energy upgrading programmes contributed to a 67 % increase in energy-enhanced housing compared to 2019. The approved number of applications in 2022 is 95.000 dwellings and the totalnumber of interventions in residential buildings in 2023 amounts to 86.545. The-plans for housing renovation in 2020-2022 made it possible tocover energy efficiency improvements for 126.000 potential beneficiaries. The total budget of the programme leveraged for the year 2021 aloneis EUR 2 billion. The corresponding budget for the 2023 programmeis EUR 973 million.

Regulatory provisions to improve the energy performance of the building stock have entered into force for the public buildings sector, such as:

- ✓ After 01/01 2023, all buildings occupied by public authorities must be classified as-energy class B and above in accordance with the Energy Performance Certificate (EPC).
- ✓ Any new lease or purchase of a building or building unit by central government bodies, from 01/01/2026, must be close to zero energyconsumption (energy class A and above).
- ✓ For each building or building unit offered for sale or rent from 01/06/2021, the energy performance index of the nastic performance certificateshall be stated in all commercial advertisements.

At the same time, the ELECTRA programme is being implemented, which aims to promote the exemplary role of the State in improving the energy performance of buildings, to meet the annual energy renovation target of 3 % of the useful floor area of central government buildings, and to achieve the national energy efficiency target. The budget of the programme amounts to EUR 620 million for the implementation of interventions in the building envelope and technical systems of the public sector, while 264 applications have already been approved out of a total of 79 applicationsfor 130 buildings and applications for a further 127 buildings are being checked.

The **use of RES systems for heating and cooling** (mainly heat pumps and solar thermal systems) will be enhanced by combining different policy measures in full compliance with the projections of the comprehensive assessment to promote efficient heating and cooling. In order to promote RES systems, initiatives were launched and programmes were implemented toreplace fine and energy-intensive appliances with new, more energy-efficient appliances, with a view to bringinghouseholds to more cost-effective, more efficient and more environmentally friendly solutions.

In more detail, the EUR 100 million ‘recycling heat switches’ programme supported both the purchase of the product and the installation of **13.589** hoursof thermosiphons. The beneficiaries of the programme amount to 103.310 outof 337.911 applications.

Accordingly, the EUR 286 million 'Recycling – Changing Equipment' programme enabled 653.772 beneficiaries to replace energy-intensive appliances, such as air conditioners, refrigerators and freezers, achieving a reduction in electricity consumption of at least 43 % at household level.

In any case, **the removal of the carbon footprint ofthe building stock** by 2050 is one of the main energy and climateyears. The **promotion of efficient heating and cooling systems** is a key politicalpriority for achieving this objective combined with the upgraduationof the building envelope. 17 % of residential buildings are expected to meet thermal needs with air-to-water heat pumps in 2030, while the corresponding percentagein 2050 is expected to increase to 91 %. The increased penetration of water-pump penetrationin the case of tertiary sector buildings is expected to be close to 69 % and 90 % in 2030 and 2050 respectively.

A key role in the decarbonisation of the building sector will be the **promotionof self-consumption fits** contributing to the promotion of RES systems in dwellings. With this in mind, programmes for the installation of photovoltaic systems with a storage system for self-generation will be strengthened, with the application of energy compensation to the household, which are installed by autoproducers for energy compensation in order to reduce energy costs for consumers, and the production of electricity from renewable sources. At the same time, with the reduction of the energyfootprint, the energy import balance improves and reduces the degree of dependence on third sources. To this end, a total budget of EUR 238 million has been launched under the 'Photovoltaic in Housing' programme.

More specifically, the **financing programmes for the renovation of both thebuildings and the tertiary sector** will continue to be implemented by adapting and improving the existing financing model with a view to increasing the layersof leverage levels by the beneficiaries. The aim of these pre-lettersis to:

- The increase of potential beneficiaries.
- Simplification of the certification of interventions, using singlecost elements.
- The more active involvement of domestic financial institutions in the financingof the required interventions.
- Promoting leadership in domestic manufacturing and industrialengineering.

Successful **funding programmes to improve the energy efficiency of residential buildings** will continue and will aim to support ecologicallyvulnerable and energy vulnerable households. In addition, the **designand materialisation of financing programmes to improve energy efficiency in enterprises** should be launched in conjunction with the **already establishedreasonable incentives** to promote actions to save energy and water in enterprises.

The promotion of efficient heating and cooling systems will **increase the share of RES in heating and cooling**, which is estimated to reach 46 % and 100 % in 2030 and 2050 respectively. At the same time, the promotion of RES technologies will contribute to increasing the participation of RES in finalconsumption by **facilitating the electrification and coupling of final consumption sectors** that remain the objectives of this NECP.

Note that the share of heat pumps in RES for heating/cooling almost doubles in 2030 compared to 2021.

Table 18 Electricity penetration indicators in the consumption of buildings

	2021	2025	2030	2050
Residential buildings with heat pump forheating (thousand buildings)	**351,3**	**519,3**	**856,6**	**2727,4**
% of new residential buildings with heat pumps for heating	**9 %**	**65 %**	**84 %**	**91 %**
Electricity demand from hot pumpsfor heating and cooling (kg tip)	**67,0**	**92,4**	**116,4**	**200,3**
Buildings in the field of heatingpump services (thousand buildings)	**109,0**	**138,5**	**150,6**	**191,3**
% new heating pumpservice buildings	**42 %**	**83 %**	**91 %**	**91 %**
Electricity demand from hot pumpsfor heating and cooling (kg tip)	**246,7**	**297,0**	**273,6**	**401,5**

Finally, buildings should make a key contribution to the widespread installation of electric vehicle charging infrastructure by contributing to the further penetration of electrificationand the achievement of the related targets.

In addition, the **design and implementation of financing programmes to improve energy efficiency in companies** has been launched in conjunction with the already **established tax incentives** to promote actions tosave energy and water in companies. For example, the 'DomesticLaw – Business' programme and the provisions of Law 4172/2013 concerning the amortisation of costs related to energy efficiency or water saving.

More generally, emphasis will be placed on the adoption of new smart technologies and will seek both to achieve cost-effectiveness and to protectequal access for stakeholders.

Finally, targeted information actions on energy efficiency will help raise awareness and ultimately encourage final customers to adopt morereasonable energy use practices in buildings.

2.3.3 Energy efficiency in the industrial sector

The existing framework for mandatory energy audits in large enterprises is in its second cycle of application and is implemented in accordance with the procedures laid down in Law 4342/2015, as revised by Law 5049/2023. In order to effectively monitor compliance by operators, the **electronic Energy Audit File** shall be operated in the form of acomplete loading system, supported by an electronic database. The results reportsand general information on energy audits shall be submitted by the energy auditors to the Energy Audit Archive. According to the results of the first implementation cycle, there are few cases of non-compliance with the frameworkof the obligation to carry out energy audits by obligated non-SMEs. The efficiency and efficiency of energy audits is expected to increase significantly in the next period in view of the new provisions of the revised Energy Efficiency Directive (EU) 2023/1791. The revised framework will also guide the performance of checks on medium-sized, energy-intensive businesses and should be accompanied by incentives forchecks for non-obligated undertakings, and in particular for the implementation of the proposed measures of energy audits for obligated undertakings.

Priority will also be given to **promoting targetedenergy saving programmes in enterprises and industry** with a focus onproductive glasses as foreseen in the NECP. The aim of thesepolicies is to strengthen the competitiveness of businesses, while at the same time effectively shielding them from the effects of future energy crises.

It is worth mentioning the obligation to reduce emissions by at least 30 % by 2030 compared to 2019 for public and private sector projects and activities whose construction or operation may have an impact on the environment and do not fall within the scope of the EuropeanEmissions Trading Scheme (ETS), in accordance with Article 19 of the Climate Law (Law 4936/2022 (Government Gazette, Series I, No 105/27-05-2022)).

2.3.4 Market mechanisms

The promotion of energy efficiency improvement interventions will befacilitated by the activation of market mechanisms. In this direction, **the Energy Efficiency Obligation Schemes** will continue to playa key role in conjunction with alternative policy measures in achieving the energy savings target. At the same time, the possibility of supporting obligated parties will be explored by developing the institutional framework forthe repayment of energy savings investments through energy bills (on-bill financing) and exploiting synergies with alternative policy measures.

Competitive processes to achieve energy savings are a fairly promising market mechanism aimed at promoting energy efficiency improvement actions in certain sectors in an orderly and efficientmanner, the tertiary and industrial sectors. Competitive processes will ensurethat energy efficiency measures are implemented in themost cost-effective and results-oriented way, as well as the reduction ofthird party interventions through the bundling of small sub-projects.

In addition, it should be noted that the political priority is to supportfinal tankers for the purchase of durable goods of advanced technology andlow carbon footprint, in order to ensure a reduction in energy consumption.

Finally, a specific set of policy measures aimed at improving energy efficiencyin the agricultural sector is under consideration. Examples include both the sub-design measure to improve the energy efficiency of pumping stations and new measures such as the energy upgrading of agricultural machinery and the reduction of energy consumption in greenhouses and livestock units.

2.3.5 Energy poverty

All energy efficiency improvement programmes in the domestic sector should alsomake a decisive contribution **to tackling the phenomenon ofextreme poverty** by reducing the social impact on Greek households. Energy poverty is a particularly important phenomenon with various implications and consequences for the economy, politics, society, health and the environment of the EU countries. In Greece, the phenomenon of energy poverty has become a particularly significant problem especially after 2011 due to the economic downturn, with the result that in the context of the NECP the fight against energy poverty is a priority and a major challenge by 2030. Please note **thatthe target of reducing energy poverty is 50 % in 2025 and 75 % in 2030 compared to 2016**. Achieving this objective requires the design and implementation ofa coherent and effective strategy aimed at combating energy poverty on a permanent and long-term basis rather than alleviating the phenomenon of energy poverty by adopting temporary andshort-term measures.

In this context, the Action Plan for Combating EnergyPoverty was drawn up, which includes both the definition of households affected by energy poverty through specific quantitative criteria, and focused on exploring specific schemes to address energy poverty either through existing policy measures or through new ones, while at the same time making use of soundfunding programmes and available market mechanisms.

In addition, a monitoring and control mechanism was set up on the basis of which the planned policy measures are assessed and improvements are proposed whenever it is considered necessaryand the smooth implementation of the procedures provided ensures that the actionplan will be implemented in accordance with the requirements and objectives of the NECP by 2030. It should be noted that a progress report will be drawn up on an annual basis, reflecting the evolution of the phenomenon of energy poverty through the implementation of the proposed-monitoring procedures, both 'bottom-up' and 'bottom-up' monitoring procedures. The aim of the progress report is to assess the achievement of the target in relation to the previous year, to specifythe policy measures in cooperation with the bodies responsible for their planning and delivery, and to formulate proposals in the event of significant divergences.

The main indicator for the measurement and monitoring of the phenomenon of extremepoverty was defined as the I BrazIIeq index, which calculates the number of households meeting both of the following conditions at the same time:

- The annual cost of each household's total energy consumption should be less than 80 % of its annual cost to cover the minimum energy consumption (Treaty I).

- The net income of each household on an annual basis is less than 60 % of the median of the corresponding reduced income based on the equivalent number of persons belonging to each household according to the OECD scale for all households according to the definition of relative poverty (Treaty II).

This indicator shall be determined on an annual basis usingthose collected from administrative sources such as the Family BudgetSurvey and the Household Income and Living Conditions Survey, carried out by the Hellenic Statistical Authority.

The share of households affected by energy poverty in 2021 is 12.4 % according to Index I I (I) IIIeq, an increase compared to 2020 (12 %). The value of Indicator I I (I), IIIeq for the year 2016, which is the reference year, was 13.8 %. The number of households affected by energy povertyin 2021 amounts to 513 thousand based on the performance of Indicator I, IIIeq.

The **Action Plan to combat Energy Poverty will therefore be upgraded bystrengthening and expanding existing policy measures, taking into account the policy priorities that will be reflected in this NECP**.

Finally, the scope of the Action Plan should be extended to include – the promotion of new technologies and the implementation of new mobility solutions in households affected by energy poverty.

2.4 OBJECTIVES AND OBJECTIVES IN THE FIELD OF SECURITYOF SUPPLY

2.4.1 Summary of objectives and priorities

With regard to the dimensions of energy security and the energy market, it should be noted that their qualitative and quantitative objectives are often complementary and interlinked, and both policies andplanned measures most often take both dimensions into account. Moreprominent is the example of energy infrastructure, both international and superiorinterconnections, which contribute to achieving objectives of both dimensions.

With regard to the security of energy supply dimension, the quality objectives developed under the NECP are broken down into the following main categories:

• **Increasing the diversification of energy sources and suppliers that come from third countries**

Enhancing the diversification ofmy energy sources and exhaust countries so that there is no dependence on a single fuel or a single country is a key objective for the next period. On the one hand, this differentiation increases the counterbalancebetween fuels and suppliers from third countries for the benefit of Greek consumers, and contributes decisively to enhancing security of supply and shielding the country's energy supply in the event ofan energy crisis at regional level.

• **Optimal use and use of indigenous energy sources:** Recognition of the the potential and optimal economic use of indigenous energy sources isa key objective and objective for the development of the national energy system. Inparticular, the use and use of RES potential, both for electricity generation and for direct disposal and use in final consumption, make a crucial contribution to energy security. However, therole of improving energy efficiency and energy savings as a type of indigenous energy source in energy security must also be highlighted in this axis. The exploitation and useof the source is essentially the horizontal priority and the first action to implement policies and measures across the themes of the NECP. Icomplement, although with a different policy approach and planning, exploration for and exploitation of indigenous hydrocarbon deposits continues to be a key energy policy for the next period and is integrated intothe wider exploitation of indigenous energy sources.

• **Promoting a country as an energy hub and a green energy exporter:**

Strengthening and exploiting Greece's geopolitical role is an objective at national level. It is therefore imperative to complete the emerging interconnections andto design new international electricity and gas interconnections with neighbouring countries. These actions will be instrumental in ensuringsecurity of supply.

In particular as regards the electricity sector, increasing the transport capacity ofinterconnections is a strategic objective and to this end the implementation/strengthening of a number of interconnection projects analysed below is promoted. These projects contribute substantially to increasing the penetration of renewable energy sources (RES) into the energy mix, but also to exporting excess green energy production to the countries of southern eastern and central Europe.

At the same time, Greece is promoting a large number ofcross-border and international gas projects by enhancing the diversification of energy sources and thus the energy security of the country and of the other European countries while remainingdependent on Russian gas.

• **Reducing the energy dependency rate:** The reduction in the energy rate dependence is another important objective for the transformation of theenergy system.

Moreover, high energy dependence is a matter of concern to the European Union as a whole. Greece's high energy dependenceis due to the particularly high use of petroleum products and secondarygas, which together account for more than 65 % of gross inland energy consumption and are almost entirely imported from countries outside the European Economic Area. The aim, as part of the NECP, is to achievea steady reduction in the energy dependency rate and ultimately progressively reduceit, ensuring the security of supply of the national energy system. Toa large extent, this target is a reduction in energy dependency from the high average rates observed in recent years, around 75-78 %. The initial**objective is to keep and stabilise as a percentage at the level of 75 % and then to drive it to the 66-70 % region by 2030.** In fact, it is plannedto bring about a visible reduction in the energy dependency rate despite the de-lignite of domestic electricity generation and the recovery of the Greek economy, mainly due to improved energy efficiency and a significant increase in the share of RES. In addition, in the post-2030 period, the objective is to further and more rapidly de-escalate the energy dependency ratio, with the main priorities being to make even greater use and use of the potential for RES and to improve energy efficiency and overall change in the pattern of energy consumption, throughgreater use of new technologies and applications.

NECP (Apr 2023)	2021 (estimate)	Central scenario					
		2025	2030	2035	2040	2045	2050
Total net imports (imports –exogenous) (thousand tip)	17216	16963	14044	9835	6808	3482	2279
— of solid fuels (thousand tips)	164	216	200	87	28	6	3
— of liquid fuels (thousand tips)	11170	11978	10006	7061	4102	2259	864
— from gaseous fuels (thousand tips)	5416	4088	3174	1657	1400	606	671
— from RES (thousand tip)	149	525	473	847	1089	1714	1624
— of green hydrogen (thousand tip)	0	0	— 9	— 43	— 93	— 1451	— 1119
— of electricity (thousand tips)	317	157	199	226	281	348	236
Energy dependency ratio (%)	74 %	74 %	66 %	47 %	30 %	15 %	9 %

Table 19 Imports and energy dependency

• **Interconnection of autonomous island electricity systems**: In Greek there are currently 28 autonomous island electrical systems (PIS), each powered by one or more thermal generating stations and consistingof one or more islands connected to each other by submarine cables. These systems are served by oil units (mainly in small and medium systems), while gas turbine units (light diesel fuel) are installed in the Rhodes System. The operation of these electrical systems requires increased financial resources, and in addition it is not fully and-necessarily possible to ensure a seamless and optimal supply of electricity totheir descendants.
The aim is that, before the end of this decade, most of these autonomous systems should have been interconnected with the interconnected system,thereby saving economic resources in the

national economy, reducing energy dependency, providing equally high quality electricity and-services to all citizens in the country, complying with the requirements of regionallegislation, and further exploiting the potential of domestic renewable energysources existing in these island systems. Even in cases wherethe interconnection of small and remote electrical systems is not technically/cost-efficient, innovative energy applications will be implemented inthese systems as part of the development of hybrid systems and policies for “smart” islands. This target translates into an interconnection of the wholeof the autonomous electrical systems up to 2029.

• **System capacity assurance: The country’s**objective is to safeguard system capacity adequacy to satisfy a minimum degree of meritto meet the electricity demand in the System, taking into account the radical transformation of the electricity generation system in the next period. The rapid penetration of RES and other technologies (storage systemsand demand crisis) may jeopardise the economic viability of gasplants, especially older ones. In order to ensure the operation of the necessary production resources to ensure the adequacy of the system, appropriatesupport mechanisms may be required.

A key pillar of the NECP to achieve the above objectives is therapid penetration of RES and thus the radical transformation of theelectricity system and its operation.

The penetration rate of RES is mainly determined by two factors:

(i) whether the energy produced at any given time can be consumed, be disposed of be or be exported to neighbouring systems (production-consumption balance); and

(ii) the capacity of the transmission and distribution networks (hosting capacity), in other words the available ‘electricity space’.

The achievement of the desired RES penetration targets is therefore largely affected by the ability of the networks (internal, as well as international interconnections)to move the generation of RES, ensuring all criteria for the safeoperation and stability of transmission and distribution systems.

In addition to the traditional demand side, transmission and distribution networks are now planned and developed taking into account the mass decentralisedinstallation of RES plants.

Based on the investment plan for the development of the transmission system, it is estimated that the electricity space for RES in 2030 will be in the order of 29 GW. At the same time, it notes a huge investment interest in the further development of RES projects, which is illustrated by the fact that only ADMIE has RES requests for a connection offer that add up to 35 GW. This momentum may put the country in a position of energy independence and security earlier than foreseen in this draft NECP. Action is therefore needed to make optimum use of the existing electrical space and to increase it.

In this context, a new strategy is needed to create a newgreen space and to make optimal use of the already existing space. Over the long term, the already presented plans to develop and strengthen networks, both internally and at the level of international interconnections, are sufficient to achieve and go beyond the objectives of this NECP. However, given that network-development projects require considerable time for permitting and maturing, as is the case at international level, other technologies such as storage (batteries and pumped storage) and demand response (Demand Response) will be required, as well as optimal management of the possibility of power cuts in RES projects.

The management of stochastic production of RES plants during the operation ofthe vesseler has a significant impact on how conventional plants operate, which are necessary to regulate the balance of production and load. For example, in the lunch hours where the production of PV/B drops sharply, it isnecessary to take over the load quickly and at an increased rate by conventional plants. There is a wide range of challenges that need to be addressed, which has been explored for many years at pan-European level.

In addition, the operation of the system at high penetration of RES facessignificant challenges (e.g. reduction of inertia, short-circuit level) relating to the fact that the majority of modern RES units (P/P, PV) are connected to the system or the network by means of electronic power devices. By using the potential of integrated plants, but also by imposing technical functional characteristics on RESpower plants, EU legislation ensures that the system isoperated incorrectly at a high penetration of stochastic forms of energy.

Finally, it should be noted that the mathematical model used applied an hourly simulation of the operation of the electric system for all projection years in the future. The hourly simulation shall include in the limitations thenecessary fall-back services and reliability criteria applied by the operators. Internally, thewind drill develops flexibility systems to balance RES, reserves for hyperday stochasticity and storage facilities to meet the criteria for reliable operation of the electrical system. As a consequence, this methodology, which has been consistently applied, results in adequacy being ensured despite the largespread of RES and with a system that is developed in an optimal way.

The following sections present the policies and measures planned in linewith the objectives developed in the NECP with regard to the security of energy supply dimension.

2.4.2 Strengthening international links

Since October 2004, the Greek Transmission System has been reoperating at the same time as the interconnected European transmission system under the overall coordination of ENTSO-E (European Network of Transmission System Operators for Electricity). The parallel operation of the Greek Transmission Systemwith Europa is achieved through transmission interconnectors, mainly 400 kV, with the systems of Albania, Bulgaria, North Macedonia and Türkiye. Inaddition, the Greek Transmission System is asynchronously connected via a submarine to a 400 kVDC current with Italy.

The new interconnection between Greece and Bulgaria became operational in June 2023. The project concerned the implementation of a second interconnector betweenthe Greek and Bulgarian systems carried out by means of an aerial interconnection of 400 kV between the Hotspot of Sandas and Maritsa East 1. The route has a nominal capacity of 2000 MVA and has a total length of approximately 151 km, of which approximately 30 km belong to Greece and approximately 121 km inBulgaria. The new 400 kV Greece – Bulgaria interconnector is an important project of European interest and is entitled 'PCI' with code 3.7.1 from 2013 up to and including the 4th list of projects of common interest (PCI) from the EU of the NSI East Electricity Priority Corridor (North-South Electricity Interconnections in Central Eastern and South-Eastern Europe).

The results of Table 19 show that the Greek interconnected electricity system, with the planned completion of future interconnection projects in neighbouring countries by the end of 2023, will meet the target of 15 % interconnection rate from 2025, i.e. earlier than target year 2030, with fullvalue for these interconnections. For 2030, the interconnectivity rateis 23.1 %.

Table 19: Hellenic Electricity System Interconnectivity level and indicators

YEAR	2023				2025				2030				2035			
Interconnection	NTC (MW)		Nominal Transmission Capacity (MW)		NTC (MW)		Nominal Transmission Capacity (MW)		NTC (MW)		Nominal Transmission Capacity (MW)		NTC (MW)		Nominal Transmission Capacity (MW)	
	From GR	To GR	EU	Total	From GR	To GR	EU	Total	From GR	To GR	EU	Total	From GR	To GR	EU	Total
GR-AL	450	450		1095	400	400		1095	600	600		2085	600	600		2085
GR-BG	1000	1150	2430	2430	1400	1700	2430	2430	1400	1700	2430	2430	1400	1700	2430	2430
GR-MK	650	650		1548	1100	850		1548	1100	850		1548	1100	850		1548
GR-TR	218	166		1200	660	580		1200	1260	1180		2640	1260	1180		2640
GR-ITS	500	500	500	500	500	500	500	500	500	500	500	500	1500	1500	1500	1500
GR-CY									1000	1000	1000	1000	1000	1000	1000	1000
GR-EG									3000	3000		3000	3000	3000		3000
GR-DE													3000	3000	3000	3000
GR-SAU													tbc	tbc		tbc
Total NTC (Import) or Total Nominal Transmission Capacity	2916		2930	6773	4030		2930	6773	8830		3930	13203	12830		7930	17203
Installed Generation Capacity [GW]	21,1				26,4				38,2				49,2			
Peak Load [GW]	10,4				10,6				11,6				12,0			
Installed Renewable Generation Capacity [GW]	13,5				17,9				27,3				38,5			
Interconnectivity Level	13,8%				15,3%				23,1%				26,1%			
	EU		Total		EU		Total		EU		Total		EU		Total	
Total Nominal Transmission Capacity / Peak Load	28,2%		65,2%		27,8%		64,2%		33,9%		113,9%		66,1%		143,4%	
Total Nominal Transmission Capacity / Total Installed Renewable Generation Capacity	21,7%		50,2%		16,4%		37,8%		14,4%		48,4%		20,6%		44,7%	

In order to meet the projected interconnectivity rate in each case and given that the development of electricity interconnections with the electricity systems of neighbouring countries is a strategic priority for the Hellenic Medium ofElectricity System, the System Operator is continuing tofoster cooperation and joint actions with neighbouring managersto plan and implement future interconnections, the feasibility of which is confirmed. In this context, the deadline for implementing theplanned interconnection with neighbouring operators is within the current decade and most of them with a view to completion earlier than 2030. The implementation of each of the new interconnections is estimated to contribute to a significant increase in the net transmission capacity of the Greek electricity system and thus to an increase in the projected interconnectivity rate for 2030. The map shows both the existing interconnections (black) and the newinterconnections based on future interconnectors (green).

2.4.3 Interconnection of islands

An important priority is the interconnection of the Aegean islands with the Continental System. These connections address their electrical isolation, increase the reliability of supply, reduce the cost of energy produced and consequently the cost of public utilities, protect the environment and take advantage of the high difficultyof the RES of the Non-Interconnected Islands (NII). In parallel with the abolition of the 'electrical isolation' of the Aegean island area, the size of the country's electricity market is increasing. To date, all the Ionian Islands have been connected to the High Voltage System (HV). Andros, Syros, Paros, Mykonos and Naxos have been connected under High Tase (HV) on the Aegean islands, while Average Tase, Antiparis, Ios, Sichinis and Fosenandros, via Naxos, Schelousa, Heraklion and Koufonisi, and through Mykonos, the Municipality of Mykonos, are connected. Several islands near the coasts (Sporades, Thassos, Samothraki, Kythira, etc.) are also interconnected under Medium Stase. Finally, several Aegean islands (mainly those that aregraphically close to them) have been interconnected with each other under Medium Voltage (MV).

In particular, over the past three years ADMIE completed the followingpre-signed island interconnection projects:

- Interconnection of Cyclades Phase B and C: (Andros, Tinos, Naxos and Syros Support (Sept and Oct 2020)

- Phase I of the interconnection of Crete: Crete – Peloponnese (early 2021)

- Interconnection of Skiathos (July 2022)

- Functional replacement of the interconnection of Aktio – Preveza (Apar 2023) andZa Cylinthos – Cylini (Jul 2023)

In parallel, the following projects are ongoing:

- Phase D of the interconnection of the Cyclades: The project concerns the interconnection of theSouth Western Cyclades and in particular the islands of Thira, Milos,Folegan Dros and Serifo with the ESMIE. The project is expected to be completed in 2025.

- Phase II of the interconnection of Crete (Crete – Attica): The project concerns the interconnection of Crete and Attica via a continuous current connector with a nominal capacity of 2 x 500 MW to VSC (Voltage Source Convergence). The project is being implemented through ADMIE's 'Ariadni Interconnection AEES'company, with an estimated completion time in 2024 and commercial operation in 2025.

Nevertheless, island systems have remained quite autonomous in the Aegean. Today, the small and medium-scale 28 autonomous electric island systems in the Aegean account for around 10 % of the country's total energy consumption.

The next objectives of island interconnections, on which ADMIE focuses, are the projects to interconnect the Dodecanese and the islands of theNorth Aegean. The planning of these projects shall include:

- Interconnection of the Dodecanese with the Continental System: the project concerns theconnection to the ESMIE of the South East Aegean Islands Group, which includes the following six (6) autonomous electrical systems: Karpathos (Kasos withconnection under MT), Rhodes (Halki interconnection under MT), Symi, Kos – Kalymnos (Psyrio, Telendos, Nikos, Tilos, Leros, Leipzig, Glass interconnection under MT), Patmos and Arkioi (Maravali interconnection under MT). The project will be implemented in two phases, with an estimated completion in 2028.

- Interconnection of north-east Aegean islands with the Continental System: The North-East Aegean interconnection project concerns the interconnection with the ESMIE of the North-East Aegean Islands Group, which includes the following eight (8) legal-electrical systems of the NII of Limnos, Agios Efstratios, Skyros, Lesvos, Chios (Psara), Samos (Frankfurt – Thiminas), Ikaria and Agathoniou. The project isa continuation of the Dodecanese interconnection project. It will be implemented in three phases, with an estimated completion in 2029.

2.4.4 Strengthening internal networks

In addition to serving demand, which is a key driver for the development of networks, the need to serve the large RES penetration is of equal importance, as part of the fulfilment of the national and corresponding European policies.

In order to achieve the RES penetration targets set, it is planned to suitably strengthen the transmission system infrastructure to increase the margins available for connecting new RES plants to the transmission system. In this context, a series of in-depth support projects for the Transmission System havebeen implemented and areplanned to contribute to the absorption and distribution of the energy generated by RES plants.

In particular, in the last three years (in addition to the international and island interconnections already mentioned), the following critical projects have been completed:

- Rio-Antirio interconnection 400 kV (Aug 2019)
- Eastern Corridor 400 kV Peloponnese (Megalopoles-Korinthos)
- Western Corridor 400 kV Peloponnese (May 2023)
- Number of new substations (WBs) to connect RES plants

At the same time, a number of projects are ongoing (at various stages of implementation), with the deadline forcompletion by 2030, such as the completion of the Eastern Corridor 400 kV Peloponnese (Korinthos – Koumondouros), the new hotspot GIS Koumoundourou (the largestin the country), which will replace the old outdoor type, the new GMI 400 kV Filips-Nea Sanda, support for the system in the regions of Ioannina, Eastern Macedosand Thrace, replacements of 150 kV pipelines in the Trizinia region, etc.

2.4.5 Technologies that enhance the reliability and security of theverbal network

2.4.5.1 Energy storage

In the course of the energy transition in the new era, the nodal role that storage systems can play, as their integration into the electrical system offers multiple advantages that economically optimise itsoperation and contribute to the reliability and security of the grid orthermal energy.

Traditionally, the main purpose of using storage systems, which has stimulated the development of large pumping stations in particular, has been to smooth the large fluctuations in production prices by absorbing energy during low night-time loads or the hours of high RES production during the day and the efficiency of stored energy at peak conditions. At the same time, storage systems such as pumped storage stations added flexibility to thethermal systems, which had a large number of inflexible power stations. The development of technology, which has led to more flexible production units, has led to a long period of interest in new pumping stations.

This has been reversed by the rapid growth of renewable energy sources and their high penetration of electricity systems. In combination with the technological developmentswhich have led to the development of new storage system technologiesthat can be installed in electrical systems and to reduce their costs,I create the conditions for the development and operation in the electrical systemof new electricity storage systems, mainly in the following categories:

- Pumping storage: Its contribution is of particular value because of the large amountof storage it provides.

- Batteries, with various connection shapes (behind the meter, at the same connection node to the RES plant, stand alone)

Depending on the characteristics of the different technologies available and the size, storage systems can provide multiple services in parallel. Themost important applications of storage for Transmission Systems are:

Upgrading transmission system capacity

The high penetration of RES sources in the electrical system requires significantly higher transmissioncapacity and transmission capacity in the system. Nowadays, the need to maintain the safety of the system in the event of disturbances necessarily leads to under-exploitation – not fully exploited under normal conditions of operation of existing transmission lines of the system. In addition, in some cases new transmission line projects are planned to ensure compliance with the criteria for safeoperation of the system (loads, voltage levels, etc.) based on the N-1 criterion. Storage systems have characteristics that allow the system to operatemore efficiently and can act in addition to transmission lines either as permanent solutions or as temporary ones, taking into account thesignificant times required for the authorisation and construction of new Transpho Ro Lines, especially when they are combined with RES plants and operate in cooperation withthem.

In general, the installation of storage systems with best practices can leadto a more efficient operation of existing transmission lines while maintaining the N-1 reliability criterion. Storage systems in such cases should be managed in a transparent and neutral way with regard to electricity markets. By way of illustration, and not exhaustively, it is stated that there is no marketimpact on the market by installing storage stations on either side ofa transport corridor, where the two stations operate equivalent in terms of capacity but in the opposite direction in order to limit the flow over the runwaywithout a total change in the flow of energy into the system.

— **Contribution to capacity adequacy in interconnected island systems withlimited capacity to interconnect and provide emergency reserve on fully interconnected islands**

Power storage stations contribute through their generating unitsto the system's capacity adequacy. This is of particular importance in islands with limited interconnection capacity. Even after an island's electricity system has been fully interconnected, in the sense of full coverage of its load, security of supply requires thatlocally distributed generation units remain available to provide emergency reserves inthe interconnector system. Part of the necessary emergency reserve capacitymay be generated by energy storage units such as, but not limited to, battery stations.

2.4.5.2 Demand response

In addition to increasing international electricity interconnections, smart meters andsmart grids are an important measure of demand response that will return the safe integration of RES into the country's electricity system. The expansion of these technologies in this decade is a key part of the above plan, allowing for the monitoring and management of the large amounts of information that will be required for their harmonious operation, making a significant contribution to the rational use of energy by end-consumers at city level.

2.4.5.3 Development and integration of offshore wind farms

In order to achieve the targets set in the National Energy and Climate Plan for 2030 and the long-term energy plan for 2050, it is necessary to speed up procedures for the integrationof new RES plants on a large scale. Projects forthe installation of RES plants, which however require major electricity transmission projects, are expected to contribute in particular to this-increase. A particular category of projects with these characteristics are projectsthat develop RES plants on islands or offshore areas with submarinelinks to the continental system.

The extension of the Interconnected Transmission System to the island site creates the conditions and makes it possible to develop offshore andcomprehensive parks as it significantly reduces the distances for the transmission ofelectricity from the generation source to the system connection points, making new areas economically viable for the development of offshore RES projects.

2.4.5.4 Gas-fuelled and solid fossil fuel thermalplants

Two new gas plants with a capacity of 660 MW and 826 MW have been completed and have been piloted in 2023. In addition, there are two additional plants with an installed capacity of 877 MW and 840 MW respectively. These units have a high degree of energy efficiency, have a relatively low technical minimum and can operate at a very fast rate of load rise and descent. In addition, renewable gases can also be burned as a percentage of green hydrogen.

The installed capacity of solid fuel thermal plants is expected to decrease with the complete withdrawal of old lignite plants.

De-lignification is a deep cut and a priority in the national energy map and is a huge opportunity for the country. On the basis of the planning (also included in the Just Development Transition Plan (SDP)), the gap in production willbe filled by RES plants, part of which will be developed as a priority in the geographical areas of the former lignite mines.

A subsequent chapter presents the timetable for the withdrawal of lignite plants, on the basis of which lignite-fired production and plant V in Ptolemaida will be stopped after 31 December 2028. However, this timetable is not adefinitive one, and feedback from stakeholders assesses the acceleration of the full de-lignite-absorption of the energy system well before 2028.

2.4.6 Climate resilience of critical energy infrastructure and Cybersecurity

The growing electrification of our energy mix and the expansion of theelectricity mix combined with its digitisation increase both the vulnerability and the possibility of cyber-attacks not only on the transmission networks but also on the electricity and gas distribution networks, on large decentralised RES power plants, on dispersedgeneration of RES by 'Energy Capacities' and on individualproducers and users of IoT-Internet of Things.

Targeted attacks on electricity networks committed by the State and the objective of obsolescence have occurred in several cases internationally since 2015, making the overall increase in the resilience, adequacy and secure operation of the national gas networks (DESFA, ENTSO) and electricity (HMIE/ADMIE) an issue of national energy security, while it is noteworthy that DESFA's non-vital operatingsystems were the subject of a ransomware attack in August 2022.

Although comprehensive cybersecurity strategies have been developed at the level of network operators at company level, there is a need to set up a specialised cybersecurityenergy strategy within the framework of the national and European cybersecurity strategies and the European Network and Information Systems (NIS) Directive 2 adopted in December 2022.

In conclusion, it should also be stressed that the effects of climate changeare already present as an energy security factor. The increasing instability of meteorologicalevents, as a result of the climate crisis, is exacerbating not only the difficultpredictability of the estimated performance of stochastic RES, but also the duration and intensity of extreme weather events, devastating fires and climatic conditions of total imagination or lack of sunshine similar to those we experienced in Greece in February and August 2021 and January 2022.

Overheat and cold periods contribute to a reduction in the efficiencyof power and storage sinks, transmission cables and thetransformer of transmission and distribution networks. Such periods of high drought can reduce the efficiency and operation of hydroelectric and pump-storage units, while major fires and catastrophic floods such as those we experienced in Thessaly in September 2023 can create severe bypesin the electricity and gas networks.

While increasing the climate resilience of energy infrastructure has been included in the operational planning of several energy producers and operators, there is a need to set up a sectoral policy on the security of critical energy infrastructure in cooperation with the jointly responsible ministries in the context of the relevant comprehensiveDirective (EU) 2022/2557 on the Resilience of Critical Entities adoptedin December 2022.

2.4.7 Reducing dependence on energy imports of hydrocarbonsfrom third countries, with a view to increasing the resilience of their regional and national energysystems.

As regards the diversification of oil imports, even before the second Russian invasion of Ukraine in February 2022, Greece was moving away from its dependence on Russian oil and gas exports. Since 2021, when Russian crude oil exports accounted for around 21 % of our-imports, they have been phased out by the end of 2022 in line with EU-wide import restrictions for Russian crude oil and petroleum products.

As regards the diversification of natural gas imports, where most of our Russian imports from Russian pipelines are linked to long-term gassupply oils expiring after 2026, Russian imports according to data from the Greek TSO for Natural Gas (DESFA) represented in 2022 around-39 % of Greek imports (or 29.53 TWh) down from the high of 45 % in 2020 (31.87 TWh).

It is important to note that Russian imports into and through the Greek frienddecreased significantly as alternative sources of supply were channelled through the Greek gas network in South-East Europe mainly in the form of LNG. In 2022, a record 35 % of all gas transported (or 2,54 bcm) through the Greek national gas system was dedicated to exports directed mainly to Bulgaria.

However, it is important to note that exports through Russian pipelines to El Delta almost halvedin the first half of 2023, reachingmore than around 43 %, representing only 23 % of total imports, although Russian LNG exports increased significantly over the same period compared to the first half of 2022 representing 18 % of all LNG shipments regasified in the Revithoussa terminal.

Overall, Russian imports accounted for 29.5 % of total imports into the Greek system in the first half of 2023, the lowest level recorded in decades. The strategic objective of the Greek government is to fully relieve itself of Russian gas imports in all its forms as soon as possible inthe current decade and the European strategy of the RepowerEU Plan adopted in May 2022.

At the same time, our firm aim is to continue to invest in the further diversionof Greece into a critical gas transit hub for the transport of non-Russian gas via non-Russian-controlled routes and infrastructure both along the East Westaxis, which will be achieved through the implementation of thefurther upgrading of the ESFA and the planned upgrade of the TAP pipeline (Trans Adriatic Pipeline) and along the South-Vora axis, which is achieved and increased through the operation and planned upgrade of the IGB interconnectorwith Bulgaria

(IGB), the Interconnector under construction of the IGNM Interconnector and the IGNM pipeline under construction.

As regards the diversification of electricity imports, it is noteworthy that with the activation of the second electricity interconnector with Bulgaria (Nea Santa-Maritsa) launched in September 2023, Greece has already reached the 15 % interconnectivity target well ahead of the 2030 milestone. The new NECP also foresees that as a result of the increase in RES over the medium to long term (starting from 2030), the country will reduce its electricity imports and gradually become a net exporter of green electricity, as evidencedby the decrease in the share of electricity imports from 6.7 % of electricityconsumption in 2021 to 4 % by 2030.

The government's strategic objective is to promote Greece as a vitaltransit gateway for cheap green energy into the European market, the verbal production of which will be produced primarily by Greece but also by large potential exporting countries in North Africa, such as Egypt and the Middle East, such as Saudi Arabia, and the completion of the electricity interconnection between Greece, Cyprus and Israel, which will lift the energy isolation of the Republic of Cyprus, the last isolated energy system of the European Union, isof strategic importance for the country.

At the same time, the government, in cooperation with ADMIE and, where appropriate, privatepromoters are seeking the maturation of three new projects that will play a key role in achieving the above objective, as they will implement Greece's interconnections to the South (interconnection with Egypt and Saudi Arabia) and to the north (interconnection with Germany).

National objectives in terms of increasing the flexibility of the national energysystem, in particular through the development of indigenous energy sources, demand response and energy storage.

In addition to the promotion of RES up to 44 % of the ATK by 2030 and the prospectof gas generation, the main sub-targets serving the above general objective, helping to increase the flexibility and resilience of our energy system, can be broken down as follows:

• Natural Gas Storage: The completion of the third reservoir in Revithoussa in 2018, together with the expected activation of Alexandroupolis's floating regasification unit in early 2024, they significantly increase the capacityfor pre-temporary gas storage.

As regards the storage of oil and petroleum products, Greece had 10 large-scale oil storage facilities in 2021, with a totaloil storage capacity of approximately 60 IWs (20 crude oil and 40 oil products DBES). The most crude oil and petroleumproducts are located near ports and refineries in Athens and Thessaloniki. The largest storage facilities are located in the Elefsina refinery (18,7 DBs), at Agio Theodorou (14,7 DBs) related to theMotor Oil Korinthos Refinery, at the Aspropyrgos refinery (approximately 8,7 DBES), in Megara (6,9 DBES), connected by pipelines to the Aspropyrgos and Elefsina refineries belonging to Helleniq Energy, and the Thessaloniki refinery (6,8 DBES).

There are also large storage facilities for oilproducts in strategies throughout the mainland and on the islands to support theoil products. During the longest period after 2021, the country's strategic securityissues were above the previous year's import threshold of 90 days, fulfilling the country's obligations arisingfrom membership of the International Energy Agency and the relevant European route(EE/119/2009).

It is noteworthy that the strength of the country's strategic oil stocks has enabled it to participate without any particular problem in the two collective actions byreleasing the collective strategic reserves of the ILO member states, which took place in March and April 2022 with the aim of shielding the global oil market from the effects of the Russian invasion of Ukraine. IEA Member States released a total of 182,7 million barrels, the largest volume of emergency stocks ever released in the organisation's history since 1974.

2.5 OBJECTIVES AND TARGETS IN THE FIELD OF INTERNAL MARKET FOR-CENTRAL ENERGY

2.5.1 Launch of Target Model

The reorganisation of the domestic electricity market and its alignment with the corresponding European electricity market along the lines of the “Target Model” was completed in the period 2020-2022, making a positive contribution towards achieving the climate and energy targets of the NECP. More effective coupling of the European electricitymarkets is being implemented by strengthening interconnections with the paired countries,with the result of increased competition and an overall increase in economic benefits for consumers and businesses.

In order to increase the economic benefit of final customers, it isimportant to further modernise the electricity transmission system and distributionnetwork through their digitalisation, so as to enable the participation of consumption inthe electricity market in real time and to enabledynamic energy packages from suppliers to participate in the electricity market.

Electricity market integration

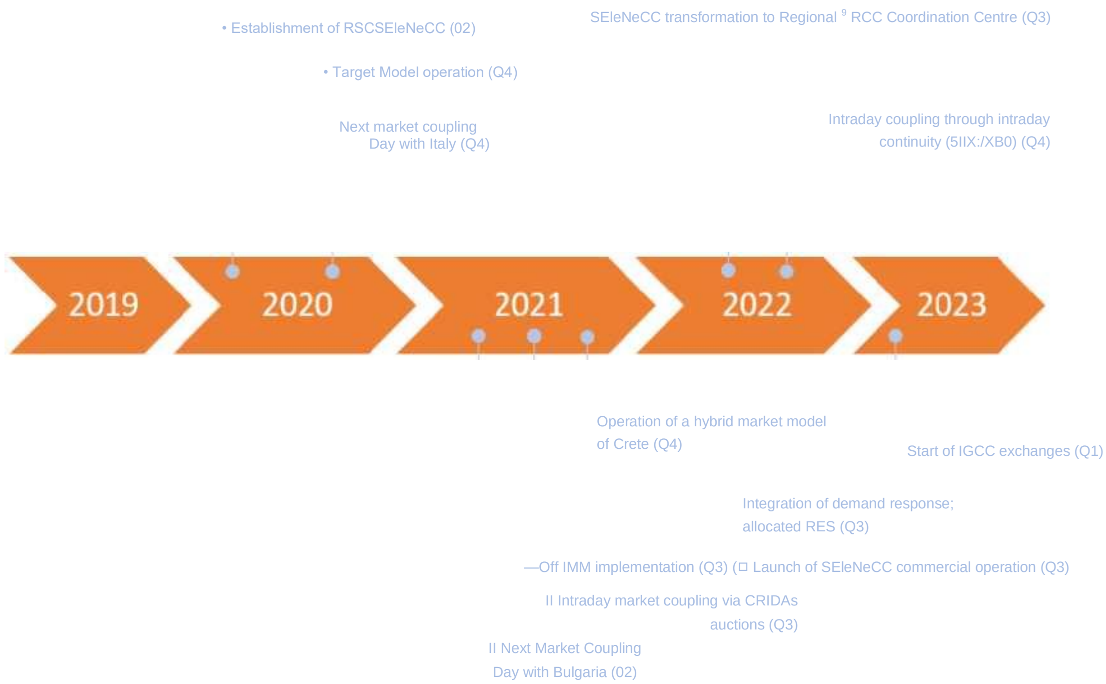


Figure 7 Market developments in 2019-2023

The integration of the electricity market started in 2020 with the launch of the Target Model.

Target Model commissioning (Q4 2020): On 1 November 2020, the Greek electricity market

(□ Connect to IGCC platform (Q3)

became operational along the lines of the European Target Model, i.e. the single electricity market model applicable in all EU countries. Its implementation is a Frenchstructural reform through which Greece complies with a voluntary obligationtowards the EU. This obligation provides for Member States to create and participate in a single European electricity market, whichreduces trade restrictions, allows connection between national markets and ensures access to all on equal terms. The Target Model comprises three markets with which the Greek energy market has fully complied, in particular for:

- **The Day-Ahead Market (Day-Ahead Market),** which is the main electricity market operated by the Greek EnergyExchange (ERA), where quantities of electricityproduced and delivered are traded the following day.
- **The Intra-Day Market,** which also operates the ERA, through which additional purchases and sales are made on the sameday rather than delivery and can correct day-ahead market positions by placingplayers in trading as close as possible to real time.
- The**Balancing Market,** operated by the Independent Power Transmission Operator

(ADMIE), where demand is balanced with available supply in real time, covers differences between the forecasts/results of the previous two markets and the actualgeneration activity and compensates power plants for their availability to contribute to this balancing process (provision of capacity reserves).

- In addition to the above, the **Forward Market, which manages the ERA,**has been operating since March 2020, where I buyelectricity contracts, with the aim of delivering it at future times and at pre-agreed prices.

The application of the Target Model in combination with the coupling of the Greekelectricity market with European energy leads to:

- Increasing competition
- Reducing any market concentration and ensuring fair and clear conditionsof access to the market
- More efficient management of interconnections with neighbouring countries
- Greater price convergence with European markets
- Enhancing the depth and liquidity of the domestic market
- Extended access to cheaper energy sources and increased security of supply
- Facilitating the integration of RES into the energy mix by introducing new markets closer to real time of consumption (Intraday Market, Balancing Market)
- Fair compensation of production units through the Balancing Market

2.5.2 Overview of existing power generation system

The evolution of the electricity system up to 2030 is characterised by the Frenchpenetration of RES and the withdrawal of lignite-fired power plants by the end of 2028, which is planned as part of the new national policy on the de-lignite-fuelling of the energy sector, as well as the reduction in installed capacity of oil plants, which are expected to be withdrawn due to highemitters and their age and to the forthcomingconnections of the islands to the interconnected system.

The total installed capacity in the interconnected electricity system in the country is 23 GW. The largest share of coverage of totalhousehold demand in 2022 comes from RES at 39 %, making renewable energy the main production component. The production of electricity using natural gas is about 35 %, contributing to the remarkable strength ofour energy system, since these plants have a notableproduction speed. The use of lignite as an energy source is steadily-declining, with a significant amount of around 11 % of total production,in line with the country's commitments to de-lignite production and reduce its carbon footprint.

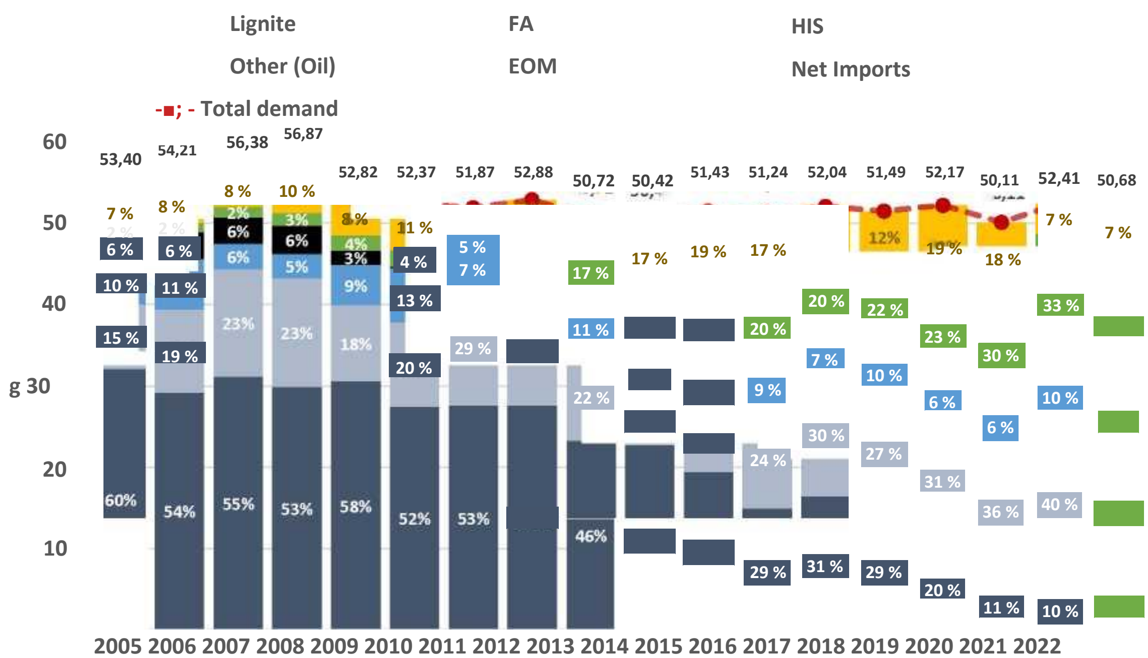


Figure 8 Evolution of electricity demand and generation *per* fuel

Continuing in the same direction, the State is committed to ensuring the transition to the new era, where energy comes mainly from renewable energy sources. Indigenous fossil energy production is experiencing a marked decline. By contrast, domestic energy production from renewable energy sources (RES) is growing rapidly.

In particular, in 2022, domestic production of energy from RES and HIS has outweighedthe production of energy from fossil fuels. This reflects thesteady progress towards our CO2 reduction targets andfor strengthening the country's energy independence.

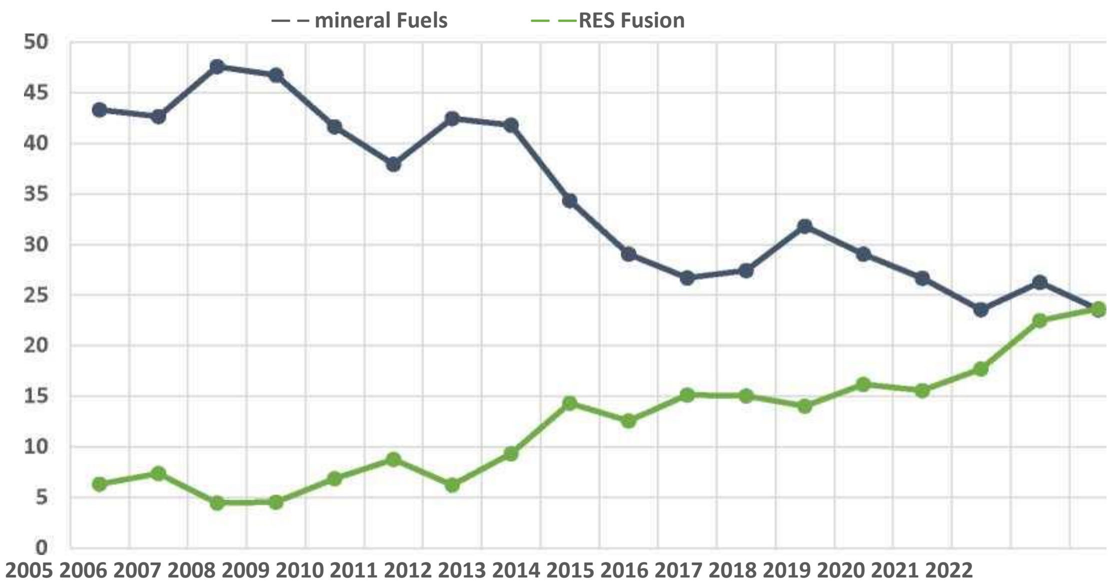


Figure 9 Evolution of domestic electricity production from fossil fuels and RES

Withthe adoption of the "Target Model", Greece has achieved a significantshift in the energy sector in some periods. For the first time, Greece has become a net exporter of electricity in periods such as the good and threemonths with significant RES penetration in the country. This means that we aremore energy than we consume, with positive effectson our independence and trade balance.

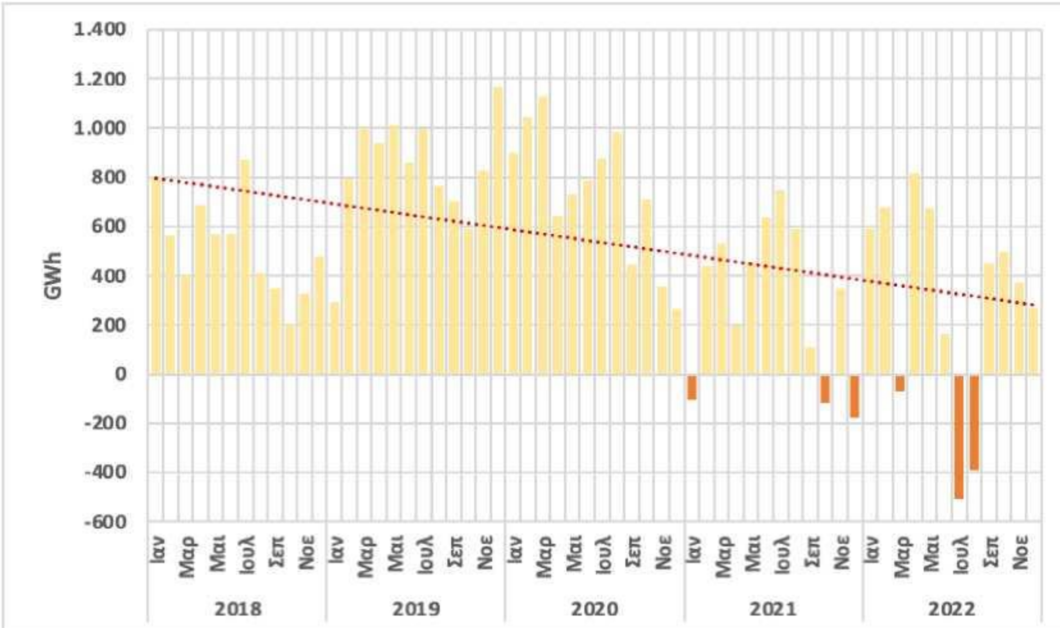


Figure 10 Evolution in net imports (positive prices) and exports (negative prices) of electricity to the system

The two main reasons for this development are:

Bidding coupling: Coupling between the different supplyzones has enabled efficient production management and energyconsumption. This has allowed energy resources to be optimally harnessed.

RES penetration: The increasing use of renewable energy sources (RES) such as wind and solar energy, combined with more efficient use of hydropower resources, has increased the production of green energy.

2.5.3 Key priorities and milestones and market evolution ofthermal energy

2.5.3.1 Milestones and evolution of the electricity market

Following the start of the implementation of the Target Model in Greece, important milestones in the integration of Greece with the European market followed by internal market restructuring, such as the introduction of demand response. At the same time, an important milestone was the connection of Crete to the Interconnected System with the completion of Phase 1 of the interconnection ('small interconnection') and the entry into operation of the Crete market as a Small Connected System (WAR) from 1 November 2021.

The milestones can be summarised as follows:

<u>Coupling the Greek electricity market with European</u>

- Day-ahead market coupling with Italy (Q4 2020)
- Day-ahead market coupling with Bulgaria (Q2 2021)
- Intraday coupling via CRIDAs auctions (Q3 2021)
- Intraday coupling through continuous intraday trading (SIDC/XBID) (Q4 2022)
- Strengthening cooperation with neighbouring operators by establishing a regional-safety checklist (RSC) Selene CC (Q2 2020)
- Commercial launch of a Regional Energy Centre (Q3 2021)
- Participation in the European platform for netting IGCC (Q3 2021)
- Interconnection of Crete and operation of a new hybrid market model in Crete (Q4 2021)
- Increased flexibility in the E/E market – Application of interruptible load service (Q3 2021)
- Full integration of demand response and distributed RES into the energy market (Q3 2022). The regulatory framework was completed on 30 June 2022 by v.4986/2022 which added the relevant articles to Law v.4001/2011 and was activated for the first time at the end of April 2023. Already in 2023, four distinct demand response entities participate in the energy market, with a total capacity of almost 135 MW.

- Some of the next milestones for the operation of the country's electricity markets are:
    - Participation in the operation of the paired European markets (day-ahead market – DAM, regional intraday auctions – IDAS, continuous intraday trading) with 15-minute products (Q1 2025)
    - Full integration of energy storage systems into theelectricity market (Q1 2024)

- Full interconnection of Crete and integration into the electricitymarket (Q2 2025)

2.5.3.2 Evolution of cost structure and average electricityprice

The table below shows an increase in the estimated average annual consumer price in 2021 compared to the forecast in the 2019 NECP for 2030, mainly due to the increased prices brought about by the energy crisis since autumn 2021. From 2025 to 2030 inclusive, the average annual consumer price is expected to decrease, in particular due to increased RES penetration combined withstorage facilities and a focus on energy efficiency, in parallel with the gradual reduction in the prices of energy products as a result of the easingof the energy crisis.

NECP (Apr 2023)	2021 (-dip)	NECP 2019 for 2030	2025	2030	2035	2040	2045	2050
Average annual consumer price (before excise duties and VAT)				**in constant Euro**				
Average consumer price before tax consumption and VAT	**187.1**	**140.8**	**149.5**	**132.6**	**118.9**	**115.3**	**111.2**	**109.8**
Unit cost of electricitygeneration	**135.3**	**91.0**	**105.6**	**84.2**	**76.0**	**73.8**	**70.3**	**70.1**
— cost of generation capital and maintenance	**55.5**	**59.8**	**52.9**	**65.3**	**63.7**	**60.4**	**60.5**	**59.6**
variable cost of electricitygeneration	**79.8**	**31.3**	**52.6**	**19.0**	**12.3**	**13.4**	**9.8**	**10.5**
Fees, miscellaneous charges, sales costs	**29.2**	**18.3**	**19.6**	**19.7**	**14.1**	**8.2**	**8.0**	**7.0**
Distribution network costs and-conveyance	**22.5**	**31.4**	**24.3**	**28.7**	**28.8**	**33.3**	**32.9**	**32.7**

Table 20 Proposals for electricity cost developments

2.5.3.3 Digitalising networks and enhancing interconnectivity

The objectives for the electricity market, complementing the guidelines ofthe European Union, are to ensure proper functioning and competitiveness for the benefit of final customers. The role of consumers is now upgraded by enabling them to provide energy from small-scale RES plants and flexibility services through demand response schemes or smart charging of electric vehicles in the grid.

Smart meters: Inorder to achieve the active participation of consumption in the energy market through demand response, it is necessary to install "off-the-counter" meters. The Distribution Network Operator (DEDDIE) plans to havea smart meter by 2030. Since 2021, 13.000 smart meters had been deployed at medium voltage level and 70.000 at low voltage level, mainlyfor high electricity demand meters. In 2022, 100.000 smart meters were installed. It is estimated to increase to 500.000 in 2023 and between 800.000 and1 cm each year from 2024 to 2030.

Dynamic pricing: In thecoming years in parallel to the development of smart meters, itis expected to promote dynamic electricity prices on the part of suppliers, with variable tariffs adjusted to electricity market prices over the days. These tariffs will encourageconsumers to adjust their consumption profile by reducing it during periods of high electricity prices and increasing the profileof high RES generation.

This strategy has several objectives:

- **Adjustment of consumption**: By using dynamic pricing,consumers will be able to monitor changing electricityprices and adjust their consumption to save money.
- **Promoting green energy**: Dynamic pricing encourages shippersto use renewable energy in periods ofhigh production, promoting green charging.
- **Participation in demand response programmes**: Consumers will be able to participate in demand response schemes, offering the hope oftheir consumption and helping to make the electricity system more efficient.
- **Enhancing the efficiency of the electricity system**: Dynamic pricing contributes to the efficiency of the electricity system by facilitating the adjustment of demand to fluctuations in renewable generation.
- **Integration of new benefit groups**: In the future, it is envisagedto gradually introduce new supply groups into dynamic pricing, asexternal meters are installed on all low-

voltage supplies.

Enhancing interconnectivity: Existing electricity interconnections with tonic countrieshave enabled, through increased imports from countries with lower electricity prices, to reduce electricity costs in order to alleviate household consumers and enhance business-competitiveness.

As RES electricity increases its share in the energy mix, Greece will export to the electricity sector and the contribution of interconnections to the management of changing flows will prevent the curtailment of quantities of energy from RES. Managing the congestion of “intrinsically” interconnections through target model markets contributes to price convergence in the European electricity market and rational powerflows, based on clearing prices in neighbouring countries.

2.5.3.4 Participation of demand response and storage in electricity markets

Demand response: Through the demand response service, offers can now be submitted to the market by the Cumulative Demand Representation Bodies (A/Z), which have been authorised by the RAAEY and represent industries and other consumers. In the short term, participants should be able to familiarise themselves quickly with the new service, so that a few hundreds ofmegawatts on the demand side can be made available by the end of the year (135 MW are already provided). The medium-termis the extension of the demand response service so that it can also be applied to the management of demand for buildings or even household consumers through the digitalisation of networks. Responding to demand as a service will become increasingly important inthe dark, as stochastic production of RES (uncontrolled production) increases.

Optimisation of the penetration of RES plants with storage in the electricitymarket and management of surplus energy from RES: The integrationof large-scale storage plants will improve market efficiency and facilitate the integration of renewable energy plants by optimal management of their variable pollution not only on a daily basis but also on a seasonal basis. Individual storagestamps can allow maximum utilisation of surplus powerleek, i.e. when the total energy generated exceeds thewarm and export potential. The proofing of the stability of the electrical system in conditions of high RES penetration and low consumption, which are now common, plays a crucial role in the rate of increase in RES penetration. An overwhelming share of the required production is covered by RES with stochastic production in addition tolow load and high-generation RES and thereis therefore no time to include several thermal plants (lignite and natural gas), which currently offer the necessary ancillary services to the electricity system. These services could in the future be replaced by portfolios with storage systems or stand-alone storage systems with long-term capacity.

2.5.3.5 Strengthening green PPA’s bilateral contracts and bydevelopment of new environmental products and markets

PPA’s platform: Greece’s strategy to promote Power Purchase Agreements(PPAS) through the development of a central platform of the Energy Exchange has two main objectives.

- Promote the financing and development of renewable energies in linewith the wider European objectives for a fastertransition in the country.
- By providing a simpler and standardised framework forbilateral PPA contracts, Greece aims to attract both domestic and internationalrenewable energies. The PPA Platform will facilitate the conclusion of PPAs by reducing the risk of counterparties.

This initiative not only promotes environmental sustainability but also strengthens the competition of Greek industries, while the possibility of state support as a guarantor promotes participation, especially among small and medium-sized enterprises. Greece’s effort to promote green PPAS underlines its commitment to building a greener, secure and resilient energy future for the country and the wider South East Europe region.

Tendering procedures for Guarantees of Origin: An additional market that contributes to the further decarbonisation of final energy consumption is the primary purchase ofGuarantees of Origin for RES energy, which is planned to be operated by the RES and Guarantees of Origin Operator (DAPEEP) by the end of 2023. The regulatory framework was completed in July 2022 and the first tender for Guarantees Origin in the Greek system is planned.

Voluntary purchase of CO_2 Emissions Default Credit: At the same time, the integration of a Voluntary Carbon Credits Markets (VCMs) Credit Market (CO_2) represents a crucial step towards acceleratingthe country’s development goals. This market will serve two main objectives:

- Initially, it promotes the active participation of businesses, individuals and organisations on a voluntary basis, allowing Greece to take important steps to tackle climate change. The market rewards solutions based on the development of the natural environment, such as reforestation, sustainable agriculture, as well as engineering works that reduce or remove carbonemissions. These activities lead to the creationof verified carbon credits, with any credit representing the removal orescape of a metric tonne of carbon dioxide from the atmosphere.

- In addition, the Voluntary Redemption Credit Market provides a transparent and standardised platform for carbon credit trading, creatingtime for businesses to invest in projects that reduce or moveaway. Through this market, participants can take immediate action to reduce climate change and offset their own carbonfootprint. This approach strengthens the role of individuals and holds themas active participants in reducing emissions, promoting individual and business responsibility to achieve a zero carbon footprint by 2050.

2.6 OBJECTIVES AND OBJECTIVES IN THE FIELD OF CRITICAL MINERAL RAW MATERIALS

2.6.1 The issue of critical raw materials (CRM) and strategies(CRM)

Rapid promotion of the energy transition, progress on security ofsupply and energy storage and the resilience of energysystems require a seamless and sustainable supply of critical raw materials (CRM) and strategies (CRM) for fossil raw materials[37-42]

These are, for the most part, the minerals and metals that are essential for the preparationof technologically advanced products of the green transition, such as hybrid and electric cars, electronic devices and circuits, magnets, wind turbines, photovoltaic systems, rechargeable appliance and vehicle batteries, catalysts, optical fibre cables, electrolysersand fuel washer and heat pumps. Table gives the most recent

37 European Commission Communication 2022/230 on REPowerEU
38 European Commission Communication 2023/62 on the Green Deal Industrial Plan for the Net-Zero Age
39 proposal for Regulation (EU) 2023/161 establishing a framework of measures forstrengthening Europe's net-zero technology products manufacturing facility (Net-Zero Engineering Act)
40 Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC
41 Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem andenabling Regulation (EU) 2021/694 (Chips Regulation)
42 Communication from the European Commission 2022/221 on the EU Solar Energy Strategy

updated European List of Critical Mineral Raw Materials (34), some of which are also considered as WFD strategies (16) [2023].

The sustainable and responsible supply and adequacy of OPHS and GPS is a major European issue[43] due to the particularly high dependence of European industry on third countries (EU imports for most metals range from 75 – 100 % of its needs), their economic importance, the high risk of supply due to global competition, distortions in the international market, geopoliticaldevelopments and the continuous reduction of their availability from domestic European sources.

In this context, the EU has prioritised the adoption **of the CriticalRaw Materials Act (CRMs Act)**[44], which is expected to be the most specific institutional framework at European level to addresssafe and sustainable access to critical and strategic fossil raw materials.

The specific quantitative objectives of the Regulation are: the annual consumption of strategic-critical raw materials within the EU should come, at least, 10 % from mining, 15 % from recycling and 40-50 % from processing of primary materials (for secondaryproduction of finished products). The time horizon for these targets is 2030, in line with the EU's climate and inlandtargets. In addition, in order to avoid monopolistic scenarios, the Regulation provides that the maximum dependence of imports from a third country shall not exceed 65 % for each strategic mineral raw material and at any relevant stage of processing, by 2030.

2.6.1.1 Greece's existing potential for critical raw materials and strategic raw materials

Morethan 15 raw materials included in the list of strategic and critical raw materials have been identified on Greek territory and within Public Mining Spaces, i.e. the sites in which the mining right belongsto the State. In particular, the CSPs identified within the DSU are: *bauxite, phosphate rock, meric, antimony, nickel, cobalt, magnesium, silicon, tungsten,its graphics, platinum group metals, arsenic, starches, gallium, germanium, manganese,Chal and some (light) rare earths*.

However, the current exploration potential that has been recorded requires both an update and classification in an international stockpile reporting system (UNFC, JORC, etc.) and a new targeted research either to increase the added value of the targets already recorded within the TWBs or to discover new 'targets', both primary (deposits) and secondary (by reprocessingmining waste), of national and/or European strategic importance.

43 European Commission, Critical materials for strategic technologies and sectors in the EU – a prospective study, 2020

44Proposal for Regulation (EU) 2023/160 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020

2.6.1.2 Actions and actions in the direction of thecountry's and the EU's legislative strategy for COPY and SOPY

With a view to ensuring the supply of the necessary fossil raw materials that will feed the energy transition industry, Greece is preparing a roadmap with **two priorities and actions towards 2030: (a) Mining exploration and (b) Exploitation of mining potential and other actions**.

In particular, the targeted actions that will be at the forefront of ensuring the sustainable exploitation, use and management of critical minerals in the context of the National Energy and Climate Plan relate, on the one hand, to the sustainable exploitation, use and management of critical mineralsin the context of the National Energy and Climate Plan, on the other hand,by launching competitive procedures for the granting of exploration and exploitation rights, as well as complementary interventions at the level ofpolitics.

In any case, the priority axes are geared towards sustainable exploitationof deposits, reducing licensing time and red tape, attracting investment, and including the benefit tolocal communities and the concept of social acceptance and authorisation, while respecting national and European regulations on the protection of thedebtor.

2.6.1.3 Mining Research

The development of targeted national research programmes is **the firstpriority**, given the key contribution of mining researchto the life cycle of mining activity and the importance of systematic mining exploration over time for the national economy. Furthermore, thorough and focused mining research to find stocks ofcrust and other mineral raw materials, and in particular from intra-European exploration, is a well-established strategy within the EU, closely linked to both the energy transition and the circularhousehold.

At national level, the mixed mineral exploration system applies. The survey is carried out either by the State (through the Hellenic Authority for Geological Research and Mining Research – EAGME) or by private individuals. The areas which have been investigated by the State (IGME, now EAGME) and which have been designated or transferred to the State asa DMI, i.e. all sites in which the mining right belongs to the State, are leased to private individuals in order to complete and completethe mining exploration and then start the exploitation phase, on the basis of the results of the exploration work. This benefits both the public and the private investor, since, on the one hand, the preparation and completion of systematic research programmes confirms the economic value of the PPAs, bringing new revenue to the State and, on the other hand, the lessee – after successful research – also receives the right to exploit the mineral deposit withoutfurther angling.

Contrary to the research and despite the provisions of the Mining Code (Law ν.δ.210/1973) on direct labour, the exploitation is carried out exclusively by private individuals (with the onlysix-fold appeal of Smyrida Naxos).

Public Mining Research

The first and absolutely necessary step in order to speed up thepromotion of incremental IPY projects is the development of research programmes targeting CGYs.

It is therefore necessary to combine the provisions of the CRMs Act with the provisions of the national legislative framework so that national research proposalscan be drawn up in accordance with the guidelines of the European Union and then implemented. The central focus in the design, implementation and implementation of research programmes is the Hellenic Authorityfor Geological and Mineral Exploration (EAGME), the supervised body of the Ministry of the Environment and Energy. Please note that Law v.5037/2023 updated the provisions of Legislative Decree 4433/1964 on public mining exploration.

The areas currently under investigation by EAGME are within the Xanthi Regional Unit for Mineral Raw Materials of the Ministry of the Environment and Energy, decision No ΥΠΕΝ/ΔΑΠ/58343/821/19.06.2020 of the Directorate-General for Mineral Raw Materials of the Ministry of the Environment and Energy on the declaration of a high level of research to be carried outby the State in the regional unit of Samos, lasting three (3) years (Government Gazette, Series II, No 2896/17.07.2020), as extended for 1 year, the area of twothSamos has committed itself to research lithium (Li).

Private Mining Research

In addition to the search by private individuals on the basis of a lease of the relevant right by the State following a competitive tendering procedure, if the site is a free right of mining and has not been classified as a DSU, the investor must haveapplied with a Mining Exploration Licence (AME) in order to carry out anyplug-in work. The procedure for MME provides for a decision of the locally competent RegionalGovernor. According to data from the Greek regions, there is currently only one AME in force, while the granting of new AMS by the competent services is being examined.

Private research is carried out in the areas of Orite Parnassos Gigona for bauxite and in the area of Molas Lakonia for zinc, silver, Gallium and Germanium, within leased DMUs.

Exploitation of mining potential and other actions

The**second axis concerns the licensing of KPY projects, with a** focus on the launch of new tenders for the exploitation of mineral deposits inPPIs with a sufficiently high degree of mineral maturity, in conjunction with other policies and actions, which will complement and reinforce theincrease in investment activity.

Competitive procedures

As regards the emergence of new areas for exploitation, the main task to be carried out isto update and complete the mapping of the potential of TWBs to be exploited and, on the other hand, to prioritise them in order to distinguish those who can be considered mature and put, as a matter of priority, in competitivetendering. This is a specialised task involving consideration of technical, persistent,economic, legal and social data and criteria.

The main criteria for this are:

(**a) Explosive maturity** related to knowledge of the quality ofthe total deposit and the quantitative reserve capacity, which are not available in most cases. It should be noted that the signs andappearances resulting from a limited number of surface samples are not maturedeposits to be auctioned, but a springboard for more and comprehensive research.

(b) the **criticality** and necessity of materials at national and European level.

(c) **'social leave'**, which requires a positive response –following information and investigation processes – by local communities, whose social cohesionand the prospect of prosperity should not be affected. It also requires responsible environmental management, which is now an obligation under national and European legislation. In order to address the issue, the expected benefits of the activity in the context of the overall development planning of the areaand in conjunction with any synergies or conflicts with other activities in the wider area of themining project should be considered and discussed publicly and thoroughly before a decision is taken on a competitive lease.

(D) the **general economic climate** that is dynamic and dictatesthe incremental interest that should also comply with the above conditions and criteria.

CHAPTER 3: MEASURES AND POLICIES

3.1 climate change, greenhouse gas emissions and removals

The definition of policy measures on climate change and in particular the reduction of greenhouse gas emissions for the period 2023-2030 aims to cover ten different policy priorities (FP1.1-FP1.9), which are presented inthe bathroom.

FP1.1: Achieving a climate-neutral economy, through de-lignification, promotion of RES in the country's energy mix

FP1.2: Decarbonisation of islands (GR-eco Islands Initiative)

FP1.3: Actions to adapt to climate change

FP1.4: Actions to reduce emissions in the transport sector

FP1.5: Actions to reduce emissions in the agricultural sector

FP1.6: Emissions reduction in the LULUCF sector

FP1.7: Strategy plans for waste management

FP1.8: Circular Economy Strategy Plans

FP1.9: Urban bioclimate regeneration and smart cities

Figure 11 Political priorities for policy measures to reduce greenhouse gas emissions for the period 2023-2030.

The 9 Policy Priorities aim to achieve the goal set inthe Paris Agreement of limiting the increase in the global average temperature to well below 2 ^{O}C-C-C and, if possible, to 1,5^{O}C – relative to the pre-industrialera, and to implement the resulting commitment of the EuropeanUnion to reduce greenhouse gas emissions by at least 55 % by 2030 compared to the year 1990. At the same time, the aim is to incorporate into national planning the European Union's long-term strategic vision for a climate-neutral economy by 2050[45]. The policy measures, which have been specified inthe context of the above policy priorities, are analysed separately in thefollowing sections.

3.1.1 policies and measures to achieve climate-neutral coatingsthrough lignite desertification

The dedependence of the economy on the polluting fuel of lignite is a key featureof the Greek

[45] European Commission – A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economyhttps://eur-lex.europa.eu/legal- content/EL/TXT/HTML/? uri = CELEX: 52018DC0773 from = EN

Government.

The reasons for **de-lignitisation** are also environmental due to climate change as well as economic due to rising pollutant emissionprices.

This transition away from lignite is possible and can be supported by Greece's strong renewable energy potential, which will be our main national energy resource in the energy mix of the future.

The withdrawal of all lignite units by 2028 will take place in an orderly and responsible manner. The absolute priority of the government is to make the transition to the post-lignite era fair for the regions of Western Macedonia and Megalopos. The table below shows in detail the timetable for the withdrawal of lignite plants taken into account in the draft NECP.

Table 21: Timetable for the withdrawal of lignite-fired plants

Power plant	Fuel	Net installed Capacity	Decommissioning
Agios Dimitrios I	lignite	274	END of 2023
Agios Dimitrios II	lignite	274	END of 2023
Agios Dimitrios III	lignite	283	END of 2023
Agios Dimitrios IV	lignite	283	END of 2023
Agios Dimitrios V	lignite	342	END of 2025
Meliti	lignite	289	END of 2025
Megalopoli IV	lignite	256	END of 2025
Ptolemaida	lignite	615	END of 2028

Additional greenhouse gas emission reductions are also expected from the integrationof autonomous island systems with the mainland system, where local, highly polluting power plants will gradually be closed down, as detailed in subsequent sections.

The Just Development Transition in Greece from 2020 to date

Greece in 2020 in the National Energy and Climate Plan (NECP) (Government Gazette, Series II, No 4893/31.12.2019) reflected specific energy and climate targets at national level by 2030, with the aim of transitioning to a climate-neutral and moreresembling economy.

Among these objectives were:

(a) the full removal of the use of lignite from the domestic electricity generation system by 2028, with a specific timetable for the retirement of the lignite plants in operation by 2023 (de-lignite); and

(b) the gradual interconnection of most island, autonomous, electricspaces with the mainland electricity system by 2029, in order to enable the cessation of electricity generation using diesel or fuel oil as fuel (decarbonisation).

In this context, the Government Economic Policy Council through the adoption of the NECP announced at the end of 2019 a roadmap for the smooth and development of the affected regions-and the transition of the affected regions in Greece, under the heading 'Just Development Transition Plan (JDDP)'.

In addition, the Council of Ministers, through Ministerial Council Decision 52/23.12.2019, set out the priorities, objectives and measures to be included in this Plan,its Intergovernmental Bodies (i.e. the Governmental Committee of the DAM Co-ordination Committee), their composition and tasks, and in 2020 it included the island regions of the North Aegean, South Aegean and Crete, extending the composition of the KyVertic and the Coordination Committee.

The development of the DAP started in 2020 and, in terms of its content, wasset up in the following five (5) development pillars, focusing on thecreation of sustainable employment, based on technological development and the productionof high value-added products:

(1) clean energy;

(2) industry, crafts and commerce;

(3) smart agricultural production;

(4) sustainable tourism;

(5) technology and education;

During the preparation of the PAP, an analysis of the intrinsic advantages of lignite regions was carried out, so that it is based on real competitive advantages of the regions, always combined with the investment interest already expressed. South Macedonia, with the main advantages of education and natural wealth, is transforming itself intoan innovative clean energy production and research centre with a diversified economic model. Megalopoli, with the main advantages of natural wealth and structures, modernises its energy and industrial profile, shifting to clean production and restarting heavy industry in the Peloponnese.

The TDAP was completed in December 2020, following extensive public consultation in accordance with the Governance of Transitions toolkit of the European Commission, and was presented tothe Council of Ministers and the Standing Committee on Production and Trade of Parliament.

At the same time as the drafting of the PAP, the Government Committee of the DIM approved (March 2020) the establishment of a distinct and singleFair Development Programme under the NSRF 2021-2027, co-financed by the JTF, with a reinforcement of its resources from the Structural Funds. In this context, ~ EUR 1,629 billion of public expenditure was committed exclusively to the affected areas as follows: 830.0 cm EUR million from the JTF, transfer (leverage) of EUR 545 million from other Structural Funds (ERDF, ESF +) and EUR 254 million from the national part of the Public Investment Programme.

The affected areas that fall under the Fair DevelopmentPlan and related to de-lignite and decarbonisation are thefollowing:

- **Region of Western Macedonia**
- **Megalopolis Greater Region**
- **Northern Aegean, South Aegean and Crete islands**

After an extensive period of public consultation of the content ofthe draft DAM letter of all three NIMs with local bodies and negotiations onprogramme texts with the competent departments of the European Commission, in June 2022 Greecebecame the first Member State with an approved Just Development Transition Programme andterritorial plans by means of EUDecisionHYPERLINK "https://www.sdam.gr/sites/default/files/2022-06/%ce%91%ce%a0%ce%9f%ce%a6%ce%91%ce%a3%ce%97%20%ce%95%ce%93%ce%9a%ce%a1%ce%99%ce%a3%ce%97%ce%a3%20%ce%a0%ce%a1%ce%9f%ce%93%ce%a1%ce%91%ce%9c%ce%9c%ce%91%ce%a4%ce%9f%ce%a3.pdf" C (2022) 3943/16.6.2022.

Policy measures linked to the objective of Inpoliticisation/Coal in the context of the Just Development Transition

The policy measures/actions included in the 2021-2027 TDP programmeare based on boththe energy and climate objectives and prioritiesof the current NECP (2019) and the forecasts and eligibility of the JTF.

In particular,the JTF aimsto provide support to the people, economies and environment of territories facing serious socio-economic challenges resulting from the transition process towards the Union's 2030 energy and climate targets.

Inthis context, the following priorities, which are directly linked to the NECP, have been identified in the DAM Programme,including following asubstantiated analysis:

1. Strengthening and Promoting Entrepreneurship

Under Priority 1, which focuses on **strengthening and promoting entrepreneurship**, inter alia, investment with a focus on new technologies, such as green H2, may also be financed. In particular, **Western Macedonia** includes flagship projects,marking the region's productive transformation and shift to RTDI and the energy sector: (a) Innovation Zone, (b) Green Data Centre and Super-Calculary-FYROM, (c) Innovation Hub for Green H2 and Energy Storage in the MTF.

For continental lignite regions (Western Macedonia and Megalopoli) priority1 focuses on transforming and enhancing the competitiveness of existing companies, which need support in their transition to the-zero pollutant household, and on the other hand on the creation and attraction of new businesses, which create jobs and lead to economic diversification, modernisationand transformation of the existing production model.

As regards island transition regions, emphasis is placed on the implementationof digital transformationand reduction of thelegacy footprint.

2. Energy Transition – Climate Neutrality

Priority 2 is of purely energy interest, aiming at thegreen transition and climate neutrality through energy efficiency investments, clean energy generation and storage, as well as its use/merit by local communities. It focuses on three (3) main categories of actions/investments:

- **Energy efficiency,** which includes projects for energyupgrading and energy savings across the available building stock (households, public buildings and infrastructure and businesses).
- Clean Energy, related to projects/investments: to support self-heating throughRES in dwellings – public buildings – enterprises – in the urban area, installation of heat pumps, support for energy

communities, units of residual biomass from forests and/oragricultural residues, biogas sinks using animal waxes and agricultural residues,etc.

- **Smart Energy,** related to projects/investments: in the field of energy storage (e.g. pumped storage), e-mobility (e.g. charging stations for electric vehicles), to improve the availability of-electricity (e.g. new or upgraded low, medium, high and extra-high voltage networks and systems), for RES district heating.

The objectives set under it for outputs and results from the implementation of the PRSP priority projects, based on the current financial breakdown, are set outin the tables below:

CATEGORY OF ACTION	Output indicator	Unit of Measurement	Total (Output value 2024)	Total (Output value 2029)
2.1 energy efficiency	RCO01 Enterprises supported (of which: micro, small, medium, large)	Number	30,00	298,00
	RCO18 Dwellings with improved energy efficiency	Number	130,00	1.304,00
	RCO19 Energy upgrades of public/municipal buildings (e.g. Municipal Services, Schools, Health Centres – Agricultural Surgeries, etc.)	m²	4.200,00	42.000,00
	RCO02 Enterprises supported by grants	Number	30,00	298,00
2.2. Clean energy	RCO22 Additional capacity for renewable energy (of which: electricity, thermal)	MW	14,00	127,00
2.3 smart energy	PSO741 Investments in new or upgraded low, medium, high and extra-high voltage networks and systems	Euro	2.300.000,00	9.200.000,00
	RCO20 district heating and cooling pipeline network recently built or improved	Kilometres	0,00	3,50
	RCO34 Additional capacity for waste recycling	Tonnes/year	0,00	320.000,00
	PSO742-Energy storage solutions (RCO105)	MWh	0,00	1.080,00
	PSO744- Alternative fuels infrastructure (refuelling/recharging points) (RCO059)	Charging points (number	101,00	201,00

Table 22

CATEGORY OF ACTION	Result indicator	Unit of Measurement	TOTAL
2.1 energy efficiency	RCR 29 – Estimated greenhouse gas emissions	Tonnes of CO2/έτ equivalent	115.509,50
2.2. Clean energy	RCR 31 – Total renewable energy produced (of which: electric, thermal) (*)	MWh/year	1.398.595,91
2.3 smart energy	PSR746 – Beneficiary population	Population	1.370.624,00
	PSR747-Increasing energy storage in the region	END users/year MW	150,00
	PSR748- Total power of installed electric chargers	kW	10.050,00
	PSR750- Beneficiary Municipalities	Number	1,00
	PSR751 – Waste separately collected (RCR103)	tonnes/year	320.000,00

Table 23

3. Land use adjustment – Circular economy

The aim of Priority 3is to repurpose land use in the lignite-fired fields and to strengthen the circular economy and provides for:

the projects/investments for the regeneration and reuse of the burntlignite land (Western Macedonia and Megalopoli) to welcome other economicactivities, i.e. the construction of the necessary infrastructure (orgreen infrastructure and technical land conversion projects) and/or superstructures to implement newland uses (e.g. business parks) in order to move the affected areas to a new economic model.

- **Targeted circular economy**investments**, within the rooted ligniteland (Western Macedonia and Megalopoli), linked to the** recycling of co-products from renewable sources and energystorage (photovoltaic panels, batteries)**. The circular economy focuses on prevention, reduction, reuse, manufacturing andrecycling of waste from new productive investments.**

4. Fair Labour Transition

The main aim is to address the socio-economic consequences of the transition through interventions to adapt human resources to professionalskills in relation to new production activities. The aims are:

- Maintaining existing jobs and reducing unemployment
- The creation of new and highly skilled jobs in new specialisations with a positive impact on local income
- Ensuring equality, inclusion and non-discrimination

<u>Categories of actions</u>

- Direct employment interventions in social cohesion in the affectedenvironments
- Promoting employment
- Upskilling; reskilling of human resources
- Adaptability of company-based workers
- Socio-economic integration
- Vocational Education and Training Infrastructures
- Social care infrastructure;
- Familiarisation – Awareness raising social and economic fabric

5. Small scale Integrated **Interventions – GR**-eco islands

The <u>Priority 5 envisages</u> **projects and investments linked to the energy transition of the** TDU regions and highlighted through all selectedterritorial strategies such as ITI and the **national GREco Islands Initiative.** (see FP1.2 and Chapter 3.1.2)

3.1.2 Actions for the decarbonisation of islands (Implementation of the GR-eco Islands Initiative)

Greece's energy transition, as reflected in the National Plan for Energyand Climate Action (NECP), is an excellent opportunity for the Greek islands to highlight the important role they can play in pursuingthe objectives set to reduce dependence on fossil fuels, while at the same time strengthening the opportunities available for this purpose in the context ofthe development transition.

The initiative is a holistic approach to the green transition of Greece's islands and expresses, inter alia, the island aspect of the NECP.

The initiative focuses on the successful transition of the Greek islands towardsclonal neutrality while stimulating local economies through a package of complementary actions in the light of sustainable development.

The initiative aims to implement interventions in a wide range of sectors. The main areas of intervention concern the four themes below. The energy transition pillar, as the main one, is also broken down into sub-sectors:

- **Energy transition,** where the main objective is to achieve Energy andKey Neutrality. This will be achieved by maximising the useof renewable sources, through hybrid power systems, storageof electricity, hydrogen production, increased energy savings in the building sector and in all sectors of activity, such as tourism, etc. In particular, the following sub-sectors can be distinguished:
    - Elimination of electricity generation from fossil fuels
    - Streamlining energy consumption
    - Supply of cheap energy to residents and businesses
    - Improving energy security
    - Reduction of the transport environmental footprint
- Sustainable resource management
- Environmental protection
- Entrepreneurship and innovation

Interventions in the above sectors are expected to have a significant positive impact on island tourism. Both green energy, energy efficiency andsustainable mobility interventions are expected to transform the islands'image, giving it a 'green' profile and thus increasing their attractiveness to those who want to visit them.

The GR-eco Islands initiative mobilises resources from all funds, programmes and general sources of funding at our disposal, such as the NSRF 2021-2027, the Just Transition Fund, the TAA, the decarbonisation fund (to be set up), etc.

3.1.3 Actions to adapt to climate change

After emission mitigation, the second pillar of international climate policy, as set by the United Nations Framework Convention on Climate Change (UNFCCC), is adaptation to climate change. Climate change adaptation measuresconcern both natural and human systems, and are developed on the basis of vulnerability assessments for ecosystems, economic sectors and population groups.

A) Impact of climate change on the energy system and the carbonbalance

Climate change will significantly affect the whole energy system. Reduced water availability jeopardises the operation of thermal power plants cooled by adjacent water bodies (e.g. lakes, rivers). Electricity transmissionand distribution networks, high voltage stations, and other energy toes andinstallations are vulnerable to extreme weather events, while coastal gasinfrastructures are, in addition, threatened by rising sea levels.

The disasters caused by the bad weather Daniel and Elias (September 2023) were indicative of the impact of climate change on the security of the energy system and of climate-related and energy-related-structures. The flood events caused significant damage and damage or even complete destruction of infrastructure, and the permanent or temporary interruption of itscommission or of the services provided. Major energy infrastructure such as power plants (e.g. dams, photovoltaics), electricity transmission and distribution substations and networks, and critical infrastructure whose operation depends on electricity, such as water and irrigation networks and rail, have been damaged and destroyed. Stopping or disrupting the operation of railways may even lead to an increase in greenhousegas emissions, as its substitutes in the provision of passenger and transport work (e.g. cars, buses, lorries) have a highercarbon footprint.

The increase in the average temperature is expected to reduce energy needs for heatingin winter and increase cooling needs in the summer around theroute. Changes in demand will lead to greater variability of loadsand shoes in very high peak loads during heatwaves, testing the electricity system.

Climate change is also expected to affect the efficiency of RES systems. Increasing average incidental solar radiation, increasing sunshine and reducing cloud coverage will have a positive impact on the efficiency of photovoltaic power stations, while the increase in air temperature is negative. Changes in the speed and direction of winds are not expected to be significant for Greece, as longas they may affect the wind potential and the performance of windfarms. Finally, changes in the availability of water resources are expectedto significantly affect the efficiency and operation of hydropower plants.

Climate change is expected to have a significant impact on both land use and forestry(LULUCF) and soil, coastal and marine ecosystems in general, which play animportant role in the carbon cycle and affect the concentration of CO_2 in the atmosphere. The extent, boundaries and geographical spread of forests are expected to change, while forests and wooded land will be threatened byincreased frequency and intensity forest fires, as well as increased episodes ofdisease and insect infestation. Accordingly, agricultural crops will be threatened by a reduction in the availability of water resources and the increase in the duration and intensity of drought periods, the increased risksof erosion, salinisation and reduced soil fertility, and the spread of diseases. Itis also necessary to change the length of the growing and growing season, the suitability of the climatic and environmental conditions for specific species andcanal works, and thus their productivity and geographical distribution. In some drops, the effects of the increased concentration of CO_2 in the atmosphere and the increase in the duration of the vegetation and growing season are expected topositively affect forest and crop productivity, but the forestry and agriculture sectors are all expected to be negatively affected by climate change, which may also affect their expected contribution to the absorption of CO_2 from the atmosphere.

Coastal wetlands and ecosystems are also expected to be negativelyaffected by the rise in sea level caused by climate change, while changes in marine environmental parameters (temperature, salinity, acidity) are expected to affect the geographical spread, composition andoutput of marine ecosystems. The impacts of climate change on coastaland marine ecosystems are expected to also affect their function as CO_2 (blue carbon) sinks.

The climate projections (temperature, precipitation, wind speed) recently produced by LIFE-IP AdaptInGR[46,47], as well as the calculation of relevant climate indicators such as the change in the number of days with strong cooling needs, the change in the number of days with strong heating needs, the change in the distanceof heatwaves and droughts, as well as the change in the wildfire risk index (FWI) are indicative of the magnitude of the impact of climate change on the country'senergy system and on the absorption capacity of CO_2 from the homesystems acting as its sinks. Climate projections at regional level were alsoreported in the context of the Regional Climate Change Adaptation Plans to be approved.

More information on the impacts of climate change can be found in the study "The environmental, economic and social impacts of climate change in Greece" by the Climate Change Impact Assessment Committee of the Bank of Greece464748, as well as in the sectoral climate change adaptation analyses providedby the Ministry of Environment and Energy in the framework of the LIFE-IP AdaptInGR project49.

B) The institutional framework for adaptation to climate change

Greece has already developed and approved by Law 4414/2016 (Article 45) the NationalSTRATE on Adaptation to Climate Change (ESPKA50). The ECHR sets out the general objectives, guiding principles and means of implementing a modern, result-orientedand developmental climate change adaptation strategy inthe context of the United Nations Convention on Climate Change, European pilot and international

46http://mapsportal.ypen.gr/thema_climatechange, https://geo.adaptivegreecehub.gr

47 LIFE-IP AdaptInGR – Boosting the implementation of adaptation policy across Greece LIFE17 IPC/GR/000006: www.adaptivegreece.gr

48Committee for Climate Change Impact Assessment (EMKA) (2011). Environmental, economic and social dishes of the climate change the Greece: https://www.bankofgreece.gr/Publica-tions/% CE% A0 % CE% BB% CE% B7 % CF% 81 % CE% B7 % CF% 82 % CE% 95 % CE% B8 % CE% B5 % CE% B7.pdf

49LIFE-IP AdaptInGR (2022). Analysis of the current situation for adaptation of biodiversity and ecosystems to climate change. Project deliverable (code: LIFE17 IPC/GR/000006).
LIFE-IP AdaptInGR (Under completion). Analysis of the current situation for the adaptation of the Forestrysector to climate change. Project deliverable (code: LIFE17 IPC/GR/000006).
LIFE-IP AdaptInGR (Under completion). Analysis of the current situation for adapting the agricultural andlivestock sectors to climate change. Project deliverable (code: LIFE17 IPC/GR/000006).
LIFE-IP AdaptInGR (Under completion). Analysis of the current situation for the adaptation of the StructuredEnvironment sector to climate change. Project deliverable (code: LIFE17 IPC/GR/000006).

50 https://ypen.gov.gr/wp-content/uploads/legacy/Files/Klimatiki%20Allagi/Prosarmogi/20160406_ESPKA_teliko.pdf

experience.

The EDSEC proposes indicative actions and adaptation measures addressing a wide range of environmental, economic and socialsectors that are expected to be significantlyaffected by climate change, including areas directly linked to the NECP and the achievement of its objectives, such as energy, agriculture, livestock farming, forests and other terrestrial, coastal and marine ecosystems with an important role in the carbon cycle, as well as the built environment (building sector), tourism, but also water resources, which are, inter alia, an important source of renewable energy.

The main objectives of the EDSCA are to contribute to better decision-making through human resources training and better available information and scientific data, to strengthen planning for adaptation at local and regionallevel and to promote a network of actions and policies inall areas, with a particular focus on the most vulnerable. The aim is toset up a mechanism for monitoring and evaluating adaptation actions andpolicies, and to inform and raise awareness among citizens.

The 13 regions of Greece have already developed Regional Climate Change Adaptation Plans (PASKA) under Law 4414/2016 (Article 43). The SPECAs specifythe guidelines of the ESSCKA, assessing climate vulnerability and defining appropriate actions and measures to adapt to climate change, also taking into account the specific characteristicsof each region. The approval process for the PSCAA is ongoing and isstill to be completed in early 2024. To date, the PSEKA of the Regions of North Aegean, Crete, Attica, Peloponnese, Western Greece, Western Macedonia and Central Macedonia have been approved.

Articles 42 and 43 of Law 4414/2016 have now been repealed, but their provisions relating to the ESCAA and the PSEKA were maintained to a very large extent and I have beenincorporated into the National Climate Law 4936/2022.

The National Climate Law (Articles 9 and 10) further promotes climate change adaptation and resilience-action at individual level, based also on the relevant provisions of the European Climate Law. In particular, it introduces an obligation for central governmentbodies to embody adaptation to climate change in their strategic and operational plans, while enabling measures and policies to enhance resilience and reduce vulnerability in all sectors of the economy and the natural environment. Adaptation to climate change has already been integrated into European and national forest and biodiversity/ecosystem strategies and their integration into water resources and building environment policies is ongoing.

The National Climate Law 4936/2022 (Article 18) also provides for the assessment of climate risks and impacts and for measures to enhance the resilience of projects to current and future climate conditions, as partof their environmental permit. These projections are expected to contribute, interalia, to climate resilience and adaptation to climate change of energy and building infrastructure, as well as other critical infrastructurelinked to energy and climate policies.

The implementation of Directive (EU) 2022/2557 , which provides for the carrying out of risk assessments of critical entities for all relevant natural and man-made risks, including natural disasters, and for measures to ensure their resilience, including measures necessary to preventincidents, with due consideration of disaster risk reduction and climate change adaptation measures, should also contribute to this.

The contribution of flood prevention planning to the protection of ecosystems witha manoeuvre role in the carbon balance, as well as to the security ofthe energy complex and critical infrastructure associated with it, is also key. 1the preliminary floodrisk assessment51 for Greece's 14 water districts examines the impactof climate change on the intensity of rainfallin each water department, as well as the raising ofyour sea level for coastal areas, and takes them into account in the definition of areas of potential high flood risk. The 1 Review of the Misdemeanours Risk ManagementPlans, which is currently under way, is expected to propose measures that willfurther strengthen the flood protection of ecosystems and infrastructure critical to achieving national climateand energy targets.

(C) Adaptation to climate change in energy and climate planning

Reduction of greenhouse gas emissions

The EECCA and the PSCs provide for actions and measures to maintain the absorption capacity of the Land Use, Land Use Change and Forestry (LULUCF) sector and betteractions and measures to maintain the good status of forest, agro-forestry, soil, coastal and marine ecosystems, which, as mentioned above, play an important role in the carbon cycle and affect the concentration of CO_2 in the atmosphere.

In particular, they shall provide for the following actions and measures:

- Improve the composition and architecture of forest ecosystems to increase their resilience to climate change (e.g. thermophilic and dry resistant species, thinning forest stands to limit-competition for soil moisture).
- Sustainable forest and forest land management: forest management plans, undergrowth management, rational grazing of silvopianecosystems.
- Limiting forest fires: modernising the legislative framework, strengtheningprevention (improving accessibility, limiting fuel), strengthening of a responsemechanism (e.g. modernisation of equipment, warning systems, education), accelerated implementation of restoration/reforestation measures.
- Reduction of soil erosion in forests and wooded areas (management of land vegetation, anti-erosion measures on burnt areas, water engineering projects).
- Understanding the mechanisms of plant behaviour in conditions of water scarcity, increased temperature and increased concentration of CO_2.
- Changes in cultivation techniques and in the selection of crops and varieties due to temperature rise and change in rainfall.
- Extension of organic farming systems.
- Addressing desertification/Updating the National Action Plan to combat desertification.
- Management of territorial resources: growing treatments to protect against corrosion,protection against deterioration of soil structure, preservation/augmentation of organic matter which degrade

51 https://floods.ypeka.gr/egyFloods/1hAnatheorisi/2019_10_PFRA_REVISION_REPORTv2_1.pdf

more rapidly due to increased temperatures, avoidance of salinisation.

- Promote restoration measures of natural ecosystems (forests, shrubs, wetlands, etc.) aimed at increasing the CO_2 commitment to the impact of climate change.
- Risk assessment of the expected effects of climate change on marine ecosystems.

In addition, the ESSPCA and the regional SCAA include actions and measures to enhance the use of RES and energy savings in buildings, tourist facilities and utilities networks and thus contribute to the reduction of air emissions from the thermaldistrict.

Energy efficiency and RES

The ESSCG and the regional SSPAs provide for actions and measures to saveenergy and energy from RES to cover the projected increase in demand and cold load peaks during the summer period (due to increased frequency, duration and intensity of the exhaust), as well as actions and measures for the adaptation and climate resilience of renewable energy sources and plants.

In particular, they shall provide for the following actions and measures:

- Assess the impact of climate change onhydropower generation.
- Improving efficiency in the energy sector in terms of water supply and consumption of future hydropower plants.
- Examination of the need to update the Energy Performance of Buildings Regulation (KENAK).
- Use of innovative and energy-friendly materials for the energy renovation of buildings and the construction of new (zero-energy consumption) buildings, as well as thevalue of RES and other saving techniques.
- Reducing the thermal and energy needs of buildings (saving technologies, energy efficient systems and equipment, saving techniques, training/informing users)
- Adapting urban planning to climate change and improving the thermal environment in cities (redesigning free spaces, refurbishment, bioclimatic planning, increasing urban green).
- Examination of the need to improve the specifications of touristestablishments.
- Saving and efficient energy use in tourism units in combinationwith the transition of the tourism product to a lower carbonfootprint.
- Information/awareness of the impact of climate change onpeople supporting tourism activity and related to the country's energy reserves and the required actions.
- Incentives for tourism businesses to reduce energy consumption.
- Modernisation of water supply and irrigation networks. Development of smart gridsand demand management systems.

It is noted that measures to adapt forests and agriculture to climate change also contribute to maintaining their biomass production capacity for energy purposes.

Energy system security

The EECCA and the RACs provide for actions and measures for climate resilience and adaptation of the energy system to climate change in orderto disrupt its effective functioning. For the sake of ease of analysis, theNECCA did not take into account the transformation of the energy system in the context of the implementation of greenhouse gas mitigation policies. CAtherefore includes adaptation actions and measures also for energy installations, such as lignite-fired power plants, which are likely to have been withdrawn before the need to protect them against the effects of climate change occurs. In addition, the ESCAA and the VSEKA include measures to manage the projected increasein heating and cold peak during the summer period.

In particular, the ESCAA and the regional SCAs provide for actions and measures, such as:

- Developing a broader energy system protection plan.
- Studies assessing the climate resilience of existing energysubstructures and installations.
- Investment programmes in energy infrastructure and network protection projects, including the relocation of network infrastructure.
- Examination of the need to amend programmes for new energy projectsunder structures and networks.
- Avoid locating energy infrastructure and networks at high climatevulnerability sites.
- Amendment of a regulation of authorisations for power generating modules and existingpermits.
- Development of programmes for the protection of water resources from which power plants are cooled.
- Investments in flexible and low-use production units on an annual basis with the possibility of rapid uplift and descending of load.
- Smart demand-side management grids to mitigate the effects ofrising electricity demand.
- Research and development of high-efficiency thermal cooling technologies on the use of water resources, smart grids and demand management systems, modern methods of protecting networks against extreme weather events.

In addition, the ECHR provides for actions, which contribute to the safety of othercritical structures, the functioning of which and their supporting systems is linked to the energy system, in particular transport infrastructure such as rail:

- Examination of the need to further lift the railway line in order to protect it (in particular sensitive electrical and electronic equipment) from high water levels in areas of high vulnerability, with the-parallel creation of more frequent and larger openings so that, in the event of flooding events, water can find a more easily outlet andthe railway infrastructure does not act as a flood deflection.
- Protection of open air rail infrastructure from winds (wind/fence).
- Integration of different types of monitoring of train traffic data.
- Temperature monitoring/warning systems on undergroundrailway railway infrastructure.

- Planning emergency routes or diversions for railtimes due to network closures in areas or points of high vulnerability.

Finally, in the context of the 'programmes to strengthen resilience to floods in Thessaly', measures are envisaged to reduce the energy precariousness of households and businesses and to ensure energy supply and betterthe operation of critical elements of water and irrigation infrastructure. At thesame time, support is envisaged:

- households, public services and businesses to take measures to increase climate resilience/flood protection of electro-mechanical installations (e.g. boiler relocation, anchorage of equipment, dispersedelectrical circuit at higher and lower floors, generator as reserve),
- farmers, businesses and municipal water and sanitation services to increase climate resilience/flood protection of water/irrigation boreholes (e.g. lifting boreholes andconstructing proofs, emergency equipment such as manual pump, generator).

<u>The contribution of the LIFE-IP AdaptInGR project</u>

The integrated project "LIFE-IP AdaptInGR – Boosting the implementation of adaptation policy across Greece", co-funded by the European Commission and the Green Fund, is the most important project for Greece's adaptation to the impacts of climate change. The project, which is coordinated by the Ministry of Environmentand Rural Development, aims to strengthen the implementation of the ESCAA of all 13 of them and supports the adaptation to climate change of national energy andclimate planning.

In particular the LIFE-IP AdaptInGR project contributes to:

- Improved access to climate information and data:
  - Access to open geospatial data and climate projection maps via the Geo-spatial Information Portal of the Ministry ofPeriods and Energy: http://mapsportal.ypen.gr/thema_climatechange
  - Development of a national online information hub on adaptation to climate change: https://adaptivegreecehub.gr
  - Update of the multidisciplinary climate vulnerability study underpinning the ESSEE (Environmental, economic and social impacts of climate change in Greece (BoE, 2011)).
- Training the human resources of the public sector inconnection with climate change.
- Support for the development of Energy and Climate Action Plans by the Greekauthorities by developing examples of SLAPs and making available free of chargedata on climate projections.
- Mainstreaming adaptation into sectoral policies,including energy, forests, agriculture, biodiversity, ecosystems, water, built environment and tourism:
  - Preparation of sectoral reports assessing the degree of mainstreaming of climate change adaptation, in consultation with the relevant sectoral services.

- Support central government services in mainstreaming adaptation into their policies**.**

- Implementation of pilot actions in priority areas for climate change adaptation, including studies and projects on forest fireprevention, implementation of smart water grid management networks, improvement of thermal conditions and microclimate in shared spaces and public buildings in urban areas, as well as flood protection.
- Establish an effective mechanism for monitoring, evaluatingand updating adaptation actions and policies.
- Informing and raising awareness among citizens and climate-vulnerableprofessional groups.
- Mobilising complementary European and national resources, as well as other funding tools, to implement climate change adaptation actions.
- Dissemination of good project practices in Greece, the Balkan Peninsula, the Eastern Mediterranean and the European Union.
- Evaluation and revision of the ESCAA and of the SCAA.

3.1.4 measures and policies to reduce emissions in the transport sector

The objective of climate neutrality of the transport sector is served primarily by electrification, but also by the use of green hydrogen and other renewable liquid fuels of biological or non-biological origin.

3.1.4.1 Road Transport52

Light Road Transport

The policy launched since 2019, mainly on light-duty vehicles (dishes,vans, taxis) and EPEVs, has made it possible to createan electro-mobility market and the circulation of electric vehiclesin the country. Achieving the revised CO2 emission reduction targets inthe light-dutyvehicle sector requires both the **continuation of existing** and the **adoption of new policies and the adoption of measures** focused on maintaining, improving **and, where necessary, extending an appropriate framework forelectrification**of this transport sector to a significant extent.

More specific emphasis should be placed on electrification of light trucks (vans), based both on the

Road52 transport means:
(A) journeys made by light vehicles (passenger cars, light lorries LCV, i.e. M1 and N1 vehicles)
(B) travel by light electric vehicles (EPEVs) and two-/tricycles and microcars (category L)
(C) journeys made by heavy goods vehicles (heavy trucks of the N2 type).
(CD) travel by means of collective transport (urban buses, track-based modes, etc.)
(D) travel by light electric vehicles (EPEVs) and two-/tricycles and microcars (category L)

obligations arising from the Climate Law for this category of vehicles and in the context of the greening of the supply chain. Inparticular, it is envisaged to adopt targeted measures and to provide indirect and direct incentives for acquisition and use for these vehicles.

Indicative policy measures should include indirect and direct financial incentives to acquire (in the form of tax incentives and subsidies to natural andlegal persons), independently and/or in combination with incentives to withdraw old polluting vehicles. At the same time, incentives to reduce the cost of using these vehicles should continue to be implemented and introduced. Furthermore, thefurther incentives should be combined with strict technical checks for old vehicles (see KTVs and on-road checks).

At the same time as the continuation/introduction of new incentives, it is also important to adopt disincentives for the use of old thermal motor vehicles specifically inprimary centres. . In this regard, alternative forms of disincentives will be examined, taking into account the maturity of the electro-mobility market and the rate of renewal of the vehicle fleet in Greece.

as you are. **Green supply chain**: The reduction of air emissions from the transport sector, and in particular the logistics chain, is a key prioritytowards climate neutrality. Recording the environmental performance in the supply chain, in particular greenhouse gas emissions in road transport and distribution of goods, inland and energy consumption within storage and distribution centres, should contribute to the decarbonisation of transport. In this context, the implementation of Article 5 of Law v.4302/2014 (GG I 225) on the green supply chain and the measures for electrification of light trucks used for the distribution of goods are particularly important. In this context, incentives and, above all, disincentives for last mile catering (e.g. incentives to replace a bicycle with E-cargo bike) will be considered.

Heavy Road Transport

The framework set out in Chapter 2 (2.XX) explores the possibility and feasibility of adopting specific policy measures for heavy-duty vehicles, around technologies that seemto be preferred as a solution, with a view to accelerating the reduction oftheir carbon footprint. More specific measures will also be appropriate to meet other objectives such as heavy vehicles in urban transport (highway, catering cars).

3.1.4.2 Urban travel – Using MMT

Passenger transport by road

Actions to decarbonise road passenger transport in Atticaare:

- Drawing up a Strategic Transport Plan and a programme for its implementation
- Implementation of a fleet renewal programme with new low-emission vehicles
- Exploring a scenario of retrofitting existing buses to use hydrogen using a total consumption

forecasting system
- Significantly increasing accessibility of pedestrian stops

For passenger road transport outside Attica, as well as interurban road transport, the adoption of measures for the use of different technological solutions, such as electro-mobility, the use of green hydrogen through pilot projects and scaling up if technically and economically prioritised, as well as the use of fuel gas as a blend of carbon footprint will be considered.

Track-based means

The actions for the development and extension of the track-based facilities in Attikishall take place:

- Extension of Metro Line 2 from Anthoupoli to Ilion (creation of 3 new passenger stations) and extension of the Eleonas car station
- Construction of Metro Line 4
- Supply of new current trains to serve line 3 of the Metro

Sustainable urban and active mobility

Measures designed and implemented to promote sustainable urban mobilityinclude:

- the overall planning of sustainable transport systems by local self-government throughthe mandatory drawing up of a Sustainable Urban Mobility Plan (SUMP) by municipalities with a population of more than 30.000 inhabitants and thosebelonging to the areas of responsibility of OASA and IACS, as well as by all regions in Greece.
- support for sustainable mobility policies and measures by the Greek Government through the-creation of an Electronic Platform for Sustainable Urban Mobility Plans (IMSUMP) to be maintained at the Ministry of Infrastructure and by means ofoperations.
- promoting active mobility through the development of the National Action Plan for the Promotion of Cycling53, the implementation of the 'NationalStrategy for the Period' and the National Accessibility Plan with a focus on climate change;
- Promotion of Light Electrical Vehicle Personnel (EPEV)54, 55 The additional dissemination of EPEVs and L-category vehicles as means of movement requires both the continuation of existing policies and measures focusing on the rapprochement,improvement and, where necessary, the extension of an appropriate framework for the electrification of this sector to a significant extent. Examples of new measures include incentives to change a vehicle (from car to bicycle) such as tax reliefs for bicycle/electric bicycle/e- for company travel/e- school bus for mass travel, tax relieffor replacement of a conventional car or MOTO with bicycle, 0 % VAT to buy a bicycle

53 in conjunction with the National Cycling Strategy

In54 accordance with the definition in the Road Traffic Code (Article 2 of Law 2696/1999), 'EPEV' means a vehicle powered by an electric motor which does not fall within the scope of Regulation 858/2018/EU, Regulation 168/2013/EU, Directive 2009/48/EC and Directive 2007/46/EC.

L-category55 vehicles (two-, three-wheeled and quadricycle microcars) serve the objectives of micro-mobility and can be tools for urban transport andlast mile deliveries in the supply chain.

In addition, new measures and policies will be considered such as:

- The development of private sustainable urban mobility plans by companies employing a large number of workers
- The introduction of a mandatory parking space for the purchase of a new car, given that the urban centres of Greek cities are among the most densely populated in Europe and parking is the main obstacle to the implementation of sustainable mobility policies therein.
- Measures to reconfigure the road environment to assignspace to non-car free forms of transport

Improving road behaviour and promoting alternative forms of travel

- Active human-poweed mobility: Promotion of provisions of the Road Cycling Code

to promote alternative forms of mobility (pedestrian, cycling, micro-mobility) in order to ensure safe traffic and the coexistence of all road usersthat will contribute to an increase in the rate of alternative or pedestrian travel.

- Economic/Ecological Driving: As part of a theoretical and practical expatriate

candidate drivers and drivers shall be trained and examined to drive economically and in a safe and environmentally friendly manner. Particular emphasis shall be placedon heavy vehicles in the initial and periodic training process forobtaining a certificate of professional competence.

3.1.4.3 Charging infrastructure for electric vehicles

The development of the necessary charging infrastructure throughout Greece is a prerequisite for further electrification of road transport in Greece. The development of such infrastructure, both publicly accessible on motorways and points inside and outside cities, as well as infrastructure for private access to homes or corporate spaces, will be served through the continuation of existing policy measures (subsidyletters and tax incentives) and the adoption of new ones.

Especially for publicly accessible charging infrastructure, new measures are needed, inthe form of financial incentives for their deployment, with a focus on high-power (fast charging) infrastructure outside urban centres andalso on normal power infrastructure within them. At the same time, regulatorymeasures should be promoted with a view to further simplifying any permit procedure required for their installation, as well as the procedure for their connection to the electricity distribution network. Particular emphasis will be placed on the increased use of RES to power these infrastructures as much as possible.

At the same time, the development and use of intelligent systems relating to communication with, control of charging infrastructure, and the possibilitiesfor users to use them more easily is promoted. The aim is to achieve the higher levels of interoperability it is possible, both between differentcharging lines within the country and with networks and providers of charging services in other European or non-European countries. Intelligent charging systems will communicate with the management of the electricity grid and through tariff incentives anddynamic pricing will manage the exact charging time of each vehicle in order to avoid congestion in the electrical infrastructure and increase the use of RES fortheir feeding. They may also be able to support the conditional use of electricity batteries for the provision of services to the electricity grid (smart charging, V2G), a measure related to the promotion of RES and the development of sufficient capacity frombilling capacity. . In recognition of the high degree of uncertainty of such solutions (V2G), H/S have not been taken into account as an additional resource for flexibility in the quantitative genes/targets presented in Chapter 2. In any case, intelligent charging systemsare expected to be an opportunity to develop domesticoperations.

3.1.4.4 Rail transport

In rail transport, electro-mobility is expected to develop further, as wellas the electrification projects of the railway network in the country.

In the context of reducing greenhouse gas emissions in the railrail sector, OSE is moving towards electrification of the largest proportionof its rail network in order to minimise the movement of polluting diesel cars.

The main projects concerning the electrification of existing railwaylines are as follows:

- Installation of Electromobility, Signalling and Telemanagement and ETCS L1 onthe standing railway line Palaiofarsalos – Kalabaka. (Length of 80 km with estimated completion up to 2025)
- Signalling – Electromobility on the existing single railway line Larissa – Volos (Length of 61 km with estimated completion up to 2025)
- Electrification of the new double railway line on the Kiato – Rododafni section (Length of 71 km with estimated completion up to 2025)
- Electrification of the existing railway line Thriasi-Ikonio (length of 18 km with estimated completion by 2030)
- Installation of electro-mobility on the existing Thessaloniki – Strymona-Promachona-Promachonas single street line (Length of 143 km with estimated completion by 2030)
- Upgrading of existing Western Attica suburbanrailway line, section: Upper Liosia – New System of Megara – Megara (Length of 34 km with estimated completion by 2025)

At the same time, it is planned to complete the following new projects for electrified railway lines:

- Construction of a single electrified railway line of standard gauge I

shoulder – Loutraki (Length of 6.4 km with estimated completion up to 2025)

- Construction of a new dual railway line Rododafni – Psyathopyrgos length

21.5 km and Psychoyrgos – 10.5 km long Patras with electro-mobility (length of 32 km with estimated completion by 2030)

• Construction of a new single railway line in the section Thessaloniki – Toxidants, electrification and signalling (Length of 206 km with estimated completion up to 2030)

3.1.4.5 maritime transport

As things stand, the choice of technology and fuel to facilitate infrastructure will be further studied and may be revised in the light of developments in the relevant technology and costs.

✓ Incentivising the retrofitting of existing ships to emit reduced emissions and the renewal of the old fleet, in particular coastal shipping and the construction/retrofitting and operation of hybrid ships

✓ Strengthening research into the development of new technologies for the use of renewable energy sources and alternative fuels

✓ Encouraging research into the development of carbon capture equipment for ships' exhaust gases

✓ Support for technologies and infrastructure for the use of energy from ports (Cold ironing)

The transition of maritime transport requires changes in both ships and ports, setting standards and ensuring the interoperability of systems between ports. As a consequence, the transition in the maritime sector is based on 3 pillars:

- Green transformation of ships;
- Green transformation of ports, and
- Green transformation of islands' interconnections

Green transformation of ships (coastal and seagoing shipping)

Coastal shipping

In the field of coastal shipping, the strategic objective isto create the right options for the Greek coastal shipping fleet to meet the new requirements of European legislation (FuelEU Maritime) and EU Emissions Trading System (ETS) and the related objectives and proposals set by the IMO worldwide, which aim to reduce the footprint of carbon dioxideemitted by maritime transport through the growing useof renewable energy sources or means of reducing carbonemissions.

In this context, consideration will be given to the adoption of measures for the renewalof the fishing fleet and for the operation of passenger ships with reduced carbon emissions when sailing. Studies on these issues have beencommissioned as a first step in designing the appropriate framework.

Seagoing shipping

- Investigation to identify the most advantageous solution ○ Policy Options in line with IMO and EU.

Green transformation of ports

Ports

With regard to ports, the aim is to provide incentives forport administrations and operators to integrate innovative programmes and actions leading to the transformation of ports into smart self-managedports and energy hubs. The actions relating to portsfocus on:

- Encouragement for the adoption of policies to protect air quality in ports against pollution through SOx, NOx and microparticle emissions.
- Take initiatives to reduce greenhouse gas and carbon emissions from port operations. Promoting policies aimed attracking and reducing emissions to air associated with key militantactivities: shipping, loading and unloading, handling of goods.
- Promote continuous improvement and energy saving policies in ports, with a focus on operational efficiency and clean technologies.
- Development of monitoring mechanisms between the Ministry of Shipping and Island Policy and the IFDVs for thedevelopment of targets, performance monitoring and reportingon progress towards the targets set to reduce thefalls from climate change.

The actions to be taken in the coming period regarding the policy measures as included in the existing NECP include:

- With regard to the **electrification of ships during the period of berthing**, the electrification programme must be continued, with studies to be carried out for all the ports of the main and supplementary network in the nextspace, including the recording of the installed electric power stations in the Greek ports.

- With regard **to the planning and inclusion of RES units in port areas in the form of self-generation,** it is necessary to ensure that the regulatory framework developed in the case of maritime power (electricity supply tovessels in ports) includes self-generation from RES in ports.
- With regard to the **strengthening of local electricity grids and at the levelof power stations in the port area,** it is necessary tocomplete the study to assess the electricity needs of all ports for 2030[56].

[56] Due to the mandatory implementation of port electrification projects, to cover these ranges, studies on strengthening electricity networks in the port area should be completed and included with high priority in the DEDDIE and ADMIE network

- As regards the **financial support – subsidisation of the energytransition – electrification of ports with the help of EU financial instruments57,** continuous guidance is required from the competent Ministry (Y-NANP) to the FLVD on finding means of financing.

In addition, the adoption of measures such as:

- Development of an adaptation observatory to the energytransition and electrification policy of ports, through which there will be a continuous record of the electricity supply sites in Greece's ports.
- Drawing up a scientific training programme for ports on issues related to the energy transformation and electrification of ports

Green transformation of islands' interconnections (port interconnections)

An integrated maritime transport transition policy also requires strengthening the interconnectivity of the Greek islands. In this context, the'rationalisation of a coastal and port network and promoting the renewal/modernisation ofthe fleet' is seen as the main intervention58, including through the establishment59 of the 'New Admiral' programme, which is a tool for financing projects of aunique nature60.

3.1.4.6 air transport

This NECP includes targets to reduce CO_2 emissions from aviation, with the gradual use of renewable liquid fuels to feed aeroplanes. In particular, the use of biofuels and synthetic exhaust will be consideredand the development of electrification infrastructure for aeroplanes will be envisaged during their stay at the airport, also on the basis of relevant targets set out in the AFIR.

The sustainable development of air transport requires the adoption of measures and incentives to support biofuel production activity in Greece, involving both the agricultural and industrial sectors, including economic instruments for research and development of the sector. Targeted support and funding at national level, as well as public-private partnerships, canimprove the availability and financial sustainability of relevant fuels to further accelerate their supply and deployment.

development plans (DEDDIE) and ADMIE.

57 Studies for electrification of vessels at berth, with European funding, have been carried out in the following ports: Piraeus, Igoumenitsa, Rafina, Volos and Heraklion

58 Included in the final report of Greece's National Strategic Transport Plan (nationaltransportplan.gr), in particular Pillar 5 'Enhancing the connectivity of Greek islands'.

59 By Law 4770/21

60 such as "port infrastructure and facilities, building infrastructure and equipment (...)" as well as"energy management".

Furthermore, for Greece, it is important that the needs for the production of SAF and the use of technologies for the production of synthetic biofuels of non-biological origin be covered, as far as possible, from domestic production, given the country's potential for renewable energy sources (RES).

3.1.5 measures and policies to reduce emissions in thefield sector

Greece's National Strategic Plan for the Common Agricultural Policy (CAP) for 2023-2027, adopted in November 2022, is the main strategic planning tool for the implementation of the 2023-2027 CAP and the development of thecountry's former sector and rural areas. The main objective ofthe Strategic ECT is to support the sustainable development of the agricultural andfood sectors by ensuring viable rural incomes and strengthening competitiveness,as well as by strengthening the socio-economic fabric of rural starters,-while contributing to the **achievement of environmental and climate horizons,**at national and European level. Through its interventions, it will contribute tothe industry of a new production model for the wider agri-food sector in Greece, with the aim, inter alia, of reducing its 'climate footprint' and adapting to climate change.

The CFP Strategic Plan (SP) places particular emphasis on achievingthe increased climate and environmental beauty. The environmental and climate ambition under the AA will be achieved through the new "**Green Architecture**" of the CFP. The three key elements in the Green Architecture are:

i) enhanced conditionality;
ii) the eco-schemes of Pillar 1 and
iii) the interventions related to the climate and environment of Pillar 2.

Enhanced conditionality sets the baseline for farmers receiving CAP payments and consists of statutory management requirements (SMR) and standards for maintaining land in good agricultural and environmental condition (GAEC). Greece will implement through the SP a system of enhanced conditionality by improving already existing Good Agricultural and Environmental Status (GAEC) practices, while incorporating some existing "greening" requirements of the previous programming period into the enhanced conditionality.

Following the enhanced conditionality, new voluntary, annual agri-environmental programmes, known as '**Eco-Schemes'**, will enhance the environmental and clericalresults achieved by Pillar 1 CAP payments. EL willallocate 25 % of the CAP direct payments budget (Pillar 1) to the "Ecological Schemes", giving farmers a choice of simple, practicalmeasures that they can apply to their farms each year, with the aimof maximising farmers' involvement in achieving climate and environmental BELon all areas under cultivation. The ecological schemes to be implemented in the three agronomic regions (arable, tree, pasture) in Greece are:

Use of resilient and adapted species and varieties to climate change
Extension of the application of ecological focus areas
Implement improved vegetation cover practices while enhancingbiodiversity

Circular economyapplications in agriculture
Improvement of agroforestry ecosystems rich in landscape elements
Aid to producers for the application of precision farming methods using the EP-gallery/implementation of input management and monitoring of environmentalmeasures

‘ Environmental management of livestock systems
Conserving and improving crops on terraced areas
The maintenance of organic farming and livestock farming methods
Protect and maintain landscapes and farming systems of high environmentalacid.

Pillar 2 interventions are grouped under the following distinct categories:

(a) payments to producers to compensate for the additional costs and income foregone caused by their increased commitments/agricultural practices targeting the environment and climate. This category includes interventions for:

· The protection of wildlife within protected areas (bird fauna, -wild mammals);

· The protection of the rural landscape,
· The reduction of the use of plant protection through the application of emalactic plant protection methods;

· The protection of genetic resources in agriculture and livestock farming;
· The transition to organic farming and farming practices,
The afforestation of agricultural land
Enhancing biodiversity and adaptation of forests to climate change.
(b) to grant aid to producers in mountain and less-favoured areas (ANCs) and areas with specific handicaps, with a view to maintaining ruralincome in these areas and continuing to pursue agricultural activity which contributes to protection against soil erosion, to haltbiodiversity and to preserve the rural landscape and to protect biodiversity and adaptation of forests to climate change in Special Protection Areas (SPAs) in NATURA 2000 areas.

(c) Public and private investment for environment and climate: This section includes:

Investments in agricultural holdings for:
- water saving;

- energy savings;

— the production of energy from RES,

— the acquisition of protective equipment against natural disasters and extreme weatherconditions.

‘ Public investments for the rational management of water (construction of reservoirs for water retention, modernisation of irrigation networks to reduce losses) as well as investments in prevention and restoration of damage to forests against biotic and abiotic damaging causes, including forestfire.

Investments for the protection of wild mammals, triangular habitats and soil protection.

Payments to producers for agri-environmental commitments under Pillar 2 and the Pillar 1 eco-schemes account for 19 % of the Community contribution from the Strategic Plan. In addition to servingthe environmental and climate objectives of the Strategic Plan, the aim is to maintain agricultural activity in mountainous and less-favoured areas, which is perfectlysuited to protecting biodiversity and tackling soil-erosion. To meet the environmental and climate objectives of the SP, 26.6 % of the resources of the Strategic Plan are allocated if the budget for the two specific interventions is taken into account.

3.1.6 measures and policies to reduce emissions in the LULUCF sector

The current policies already implemented under national or strategic plans or other national, European or international commitments of Greece that contribute to the sector’s absorption are mainly the following:

- Strengthening the protection of forests against natural disasters
- Afforestation and restoration of degraded areas
- Afforestation of agricultural land
- Production of long-life wood products.

In addition, based on the National Reforestation Plan, which has been included in the Recovery and Resilience Fund, 50.000 hectares will be restored to degraded forest ecosystems in Greece by planting seedlings (endemic, slow-burning species and with a focus on blending areas).

The planning for the coming years includes the implementation of the following measures and actions to strengthen the forestry sector:

– Impact reduction projects, forest fire prevention and management actions, forest fire prevention actions to mitigate and prevent impactson forest ecosystems, actions to prevent and restore damage to forests of Natura 2000 sites
– Carry out reforestation studies

– Afforestation of agricultural land, afforestation, maintenance of woodland/woodland, construction of mountain anti-erosion and flood protection projects,restoration of forest infrastructure, other prevention actions and restoration of damage to forests from fires, pathogens and floods
– Implementation of reforestation studies, modernisation of equipment and flightfirefighting, reinforcement of extinguishing, prevention and response equipment for forest fires
– Climate change mitigation actions, forest management, forest fire prevention and response, forest fire protection, forest nurseries/seeds
– Preventive fire protection measures, forest management, reforestation, streams –anti-seedling protection of forest soils, forest seedlings – collection
– National Climate Change Observatory
– Databases of environmental data for geospatial information.

In addition, the LULUCF sector in terms of carbon removal is to be strengthened by additional actions such as:

- Increase of woody energy crops to produce biomass to 50.000 ha by 2030 (afforestation), which could result in the desorption ofan additional 192 Kt CO2eq in 2040.
- An increase in the production of wood products, which could result in the absorption of an additional 400 Kt CO2eq in 2040.
- Integrating the climate dimension into management studies, with measures to increase carbon storage in forests.

In addition, the mitigation of emissions and the increase inLULUCF removals should be strengthened by implementing policies and measures to conserve andtax the use of soil resources and land management practices. Such actions concerning soils, which are already included in the Strategic Plan for the Common Agricultural Wineof Greece 2023 and are expected to contribute to an increase in removals, are:

- maintaining and increasing soil organic matter
- improving agroforestry ecosystems
- soil protection from erosion
- preservation of carbon-rich soils
- the protection of wetlands and peatlands
- the maintenance of permanent grassland.

3.1.7 Measures and policies for waste management

The waste management sector is an integral part of the national energy and climate plan. Waste, which emits large amounts ofgreenhouse gases, requires appropriate treatment based on the waste hierarchy, prioritising preparation for re-use, recycling, followed by material/substance or energy recovery, thus contributing to tackling climate change as well as promoting the circular economy. Moreover, the National Waste Management Plan (NWMP), revised in 2020 and 2023, is the roadmap for moving from the existing-waste model to a modern, efficient, environmentally friendly andcompetitive circular economy by 2030, while contributing to achieving climate neutrality.

To this end, actions shall be promoted concerning (a) the separate collection and aerobic or anaerobic treatment of bio-waste (urban and agro-livestock, including edible fats and oils), which are a priority stream, for compost production and/or energy recovery, (b) separate collection of waste materials (plastic, paper, glass and metals) for preparation for re-use, recycling/recovery of materials, and (c) the production of alternative secondary fuels and energy recovery from the energy intensive industry and waste to energy recovery plants by assisting in the substitution of seasonedfuels from biomass/biofuel and waste fuel.

In addition, as regards food waste which has a significant impact on greenhousegases emitted, measures to preventtheir creation and correct dissemination are provided for in both the Waste Framework Law 4819/2021 (Government Gazette, Series I, No 129) and the National Waste Prevention Programme, and food waste reduction targets have been established, also contributing to the UN Sustainable Development Goalof reducing food waste per capita by 50 % by 2030. In particular, by 2030 a) a reduction in food losses along the chainof supply and supply, and b) a reduction of thirty percent (30 %) of food waste per capita onretail and consumer markets in relation to food waste in 2022. In parallel, measures are being takento encourage the donation and redistribution of food for human consumption.

In addition, it is planned to strengthen and upgrade waste treatmentinfrastructure in order to fully cover the country. In particular, it is preferable to upgrade the Cleaning Materials Clearance Centres (KDM) and to upgradewaste treatment plants to recycling recovery plants, where separately collected recyclable materials and biowaste will be processed, while residual mixed waste will be reduced over time. There is also a significant reduction in the number of uncontrolled wastedisposal sites for which Greece pays a financial fine to the EU, as waste treatment and disposal plants serve neighbouring areas areoperated.

The central objectives of national planning shall be the preparation for re-use and recycling of municipal waste generated by at least 60 %by 2030 and, upon completion of the projects, the reduction of municipal waste landfilled to 10 % of total municipal waste generated in 2030 instead of 2035 in accordance with Directive 2008/98/EC.

Please note that the generation of energy from secondary fuels RDF (Refused Derived Fuel) or SRF (Solid Recovered Fuel), recovered from mechanical/biologicaltreatment plants for residual mixed municipal waste (NPE and RRF) andpossibly also from RDD, is compatible with:

- waste management and valorisation using modern circular technologies;

- the requirements of the circular economy, given that the energy use of secondary fuel is higher in the waste hierarchy than its final disposal in landfills;
- the European Commission’s guidance on the diversion ofwaste landfilled by 90 % by 2035;

while CO_2 emissions from its use are lower than fossil fuels because RDF/SRF contains a significant proportion of biomass.

Special management and concrete measures will be taken to address the waste season, with the aim of fully covering island regions during the tourist season.

Waste management: The current National Waste Management Plan (NWMP) for 2030 and the corresponding Regional Waste Plans (PESDA), which are under consideration,will intensify a series of measures for integrated waste management, always following the requirements of the circular economy. The NDA, the National Waste Prevention Programme, the PESDA, collaborative and with the National Circular Economy Action Plan, are a realistic plan foraligning with EU requirements and developing a management model with ‘less waste with more value’.

3.1.8 Measures and policies for the Circular Economy

A key tool for coordinating policies and actions towards a more circular economy is the ‘New Action Plan – Roadmap for the Circular Economy’, which was approved by Ministerial Council Act No 12 of 29.4.2022 (Government Gazette, Series I, No 84). This plan, which is a revision of the previous National Operational Plan 2018-2019, has a time horizon for implementation in 2022-2025, is in line with the objectives of the corresponding European Commission Action Plan and is compatible with national legislative developments.

The general actions contained therein have been divided into four groups

(a) sustainable production and industrial policy;

(b) sustainable consumption (c) fewer waste with a higher value; and

(D) horizontal actions

this also includes specific actions for product groups, such as excavation waste, construction and demolition waste and water.

Actions relating to **sustainable production and industrial policy** have beenidentified:

- **tax incentives** for investments aimed at the green economy andland by small and medium-sized enterprises (JMD 139818 ΕΞ/2022);
- **sustainable production criteria** for products, as part of extended producer responsibility schemes (Article 9 (3b) and Article 78 of Law 4819/2021), which may be revised following the adoption of the proposal for an Ecodesign Regulation
- requirements for **recycled plastic content** in plastic containers and cups (Article 6 of Law 4736/2020), to be completed after the adoption of the proposal for a Regulation on packaging and packaging waste.

Also, in the framework of LIFE IP CE GREECE on the circular economy, the NationalESYP/ELOT Installation Body has carried out an overview of the **standards for secondary materials**, with a view to developing relevant technical specifications.

Actions related to sustainable consumption;
- the development of Creative Re-Use **Centres for Materials (KJHA**) has been regulated (Article 18 of Law 4819/2021), and a supporting study has been completed for the creation of a roadmap including the definition of a framework for their operation and funding.
- the **obligation to inform consumers of repairable** and upgradable products such as furniture, electrical and electronic equipment and products containing software has been legislated (Article 17 of Law 4819/2021)
- **information and training actions** are also provided for inthe national waste management plan (Ministerial Decision No 39/2020 (Government Gazette, Series I, No 185) and Ministerial Decision No 5/2023 (Government Gazette, Series I, No 94)), the National WastePrevention Plan (Ministerial Decision No 11/2022 (Government Gazette, Series I, No 83)) and the Waste ManagementPlans contained therein. In addition, for the period 2022-2023, the Hellenic Recycling Agency is implementing **a programme aimed at promoting environmentalawareness, waste prevention**, including reuse and recycling by separate collection, andreducing the impact of plastic products on the environment.

With regard to actions for **less waste with more value,** reference is made in particular to the creation of a framework for the development and implementation of '**Pay-as-you-throw'**(RAYT) systems (see Article 37 of Law 4819/2021), 'A roadmap has been drawnup in the framework of LIFE IP CE GREECE for the circular economy and is awaiting its adoption.
- the creation, organisation and authorisation**of Extended Pipeline Responsibility schemes(** referred to in national legislation as 'alternative management ofRFCs) for currents such as textiles, vehicle spare parts, photovoltaic panels, wind turbines, pesticide packaging,pharmaceuticals, mattresses, furniture, fishing gear, tobacco products, balloons and wet wipes. The relevant framework has already been laid down for tobacco products, fishing gear, wet wipes and balloons (Articles 8-10 of Law 4736/2020), and for textileproducts, agricultural plastics, householdpharmaceutical products, sleeping mattresses and furniture (Article 10 of Law 4819/2021). In addition, a supporting study has been prepared for systems-on textile products and mattresses, and specific arrangements for pesticide packaging and agricultural plastics are under preparation.

- Promoting the **use of secondary (waste) fuels** in energy-intensive industries, as well as the creation of a network of thermal treatment facilities for the energy use of residual municipal solid waste and waste fuel, which have been regulated by law (Article 63 of Law 4819/2021) and described in the National Waste Management Plan ESDA2020 2030 (Ministerial Decision No 39/2020 (Government Gazette, Series I, No 185) and Ministerial Decision No 5/2023 (Government Gazette, Series I, No 94)). To this end, a preliminary assessmentstudy on alternative thermal treatment technologies forwaste and/or secondary fuels has been launched and a study is under preparation for the creationof a network of municipal waste energy recovery units. In addition, a voluntary cooperation agreement has been signed between theMinistry of Peru and Energy and the Hellenic Cement Industry Association (July 2019) on the exploitation of secondary fuels by the cement industry in the context of industrial symbiosis and the circular economy.

- **Intensifying checks at all stages of waste management**, including the installation of an electronic-positioning system (GPS) on all means of transport of waste by road (Article 43 (2) and (3) of Law 4819/2021, and Ministerial Decision ΥΠΕΝ/ΔΔΑ/107482/1848/2022). Special obligations have also been laid down for the treatmentof hazardous waste generated by health establishments (Article 43 (5) of Law 4819/2021) and require waste treatment plantsto have an environmental management system (Article 51 of Law 4819/2021). In order to further ensure transparency, avoid arbitrariness of the administration, ensure fair law and healthycompetition, **a synchronisation of the framework for environmental** inspections (Law 4843/2021) has been completed. the implementation of a Compliance Action Model (MIS) (Ministerial Decision ΥΠΕΝ/ΓΔΣΕΕ/16675/165) has been adopted and PresidentialDecree 39 (GG I 92) was published in April 2023 on the establishment and maintenance of the register of environmental auditors, which also allows for the use of the skills of staff outside the narrow public sector.

- as regards **the regulatory framework for the production of biomethane** and an examination ofthe injection capacity of natural gas networks, which has also been included in the Recovery and Resilience Fund projects, a study is under preparation and the relevant regulation is expected to be issued in 2024.

The New Circular Economy Action Plan also includes a number of **horizontal actions**, such as

- Actions on **single-use plastics** in application of Law 4736/2020 (Government Gazette, Series I, No 200), including prohibitions on the placing on the market of certain single-use plastic products, are also being carried out in cooperation with the InterdepartmentalMarketControl Unit of the Ministry of Development and Investment, which is responsible for monitoring the implementation of the obligations on retail, catering and catering businesses (Article 29 of Law 4994/2022).
- Setting a **policy framework** for (a) education, training, lifelonglearning and social innovation in circular economy sectors and (b) promotingcircular innovation in research, innovation, digital technologies. It should be noted that the policy framework for promoting the circular economy in research and innovation is set out in the National Strategy for Smart Smarter 2021-2027 adopted in June 2022, as the Circular Economy is a distinct priority area in this strategy.
- A single state aid action ‘Research-Creation-Innovator’. This is the **‘Research Innovation’ action** for the period 2021-2027, which focuses on targeted interventions for the circular economy.

- **A multiannual funding plan for research infrastructures**, reflecting the country's priorities for long-term investments in large-scalenuclear infrastructures with the Secretariat-General for Research and Innovation (GSRT, under revision).
- Action to promote the **creation of a non-toxic environment,** which began in 2022, witha 5-year duration and active participation of bodies such as Aristotle Pa NScience, the Benaki Phytopathological Institute, and the General Chemical Laboratory oftheir Kra.

Finally, as regards **specific actions** as a matter of priority, the newAction Plan also includes waste from excavation, construction and demolition (EAC) and water.

Waste from excavation, construction and demolition (EEK) includes:
- **Enhancing the efficiency of** the alternative management of ECCs. Issues such as selective demolition, the obligation to collect separately, the requirements for maximum recovery, etc. have already been regulated (Article 30 of Law 4819/2021). Evaluation criteriahave been established by the Hellenic Recycling Agency with a view to promoting the standardisation of the procedure for drawing up the operational plans of the management systems concerned. Rules have also been laid down forthe determination of the financial consideration paid by these systems to processing units of ECDCs (Article 30 (6) of Law 4819/2021). For the integrity of the weighing, these units must have certified weighing systems and, from 1.1.2023, all vehicles transporting waste excavatorsand demolitions must have GPS (Article 30 (9) of Law 4819/2021).
- The **development of markets for secondary materials** resulting from the processing of ECCs. Relevant data are being examined in the context of the revision of the nationalstandard for public works (ELOT/Ministry of Infrastructure and Transport). It also promotes the use of recovered aggregates from-waste treatment plants in public works, in implementation of the National Green Public Procurement Plan, through relevant specifications.

For **water**, funding is foreseen for proposals relating to

(a) interventions **to reduce wastewater** at the distribution and consumptionstage;

(b) **water use efficiency** of economic activities with significantdumping;

(c) **waste water treatment projects** in priority agglomerations C and D; and

(D) **reuse of water and sludge** from waste water treatment plants (e) **collection and use of rainwater.**

In particular,
- projects for the treatment of waste water and access to high-quality drinking waterand comprehensive holistic programmes are included in the **Operational Programme'Environment and Climate Change**'

2021-2027 (C (2022) 6045).

- water resource management interventions (such as waste water treatment,rainwater collection and valorisation, sludge management, RES desalination, reuse of waste water treatmentplant flow, digitalisation/smart metering/teleme-three, water saving, connectivity with networks, public awareness, water saving actions, etc.) are included **in the GR-eco Islands initiative**.
- actions to reduce losses of irrigation networks, modernise networks and promote investments in water saving and reuse on farms are included in the **2023 CAP National Strategic Plan2027**.

Finally, the **Recovery and Resilience Fund** and Axis 1.4 'Promoting thetransition prone' also include investments in the circular economy,water resources prevention, modernisation of water supply infrastructure to optimise savings on available stocks, modernisation of urban wastewater treatment plants with reusing treated water andsludge management infrastructure in major cities, as well as major investments in irrigation networks aimed at smart use of water resources and saving availablewater reserves.

3.1.9 Measures and policies for urban bioclimate regeneration and smart cities

Cities can play an important role in the development and implementationof climate change policies and measures, as they are the places where local actions and national and international commitments to mitigate climate change cometogether. Urban and industrial areas in Greece have a significant share of energyconsumption and greenhouse gas emissions. Therefore, BELin urban planning, traffic organisation and management of localprojects will make a major contribution to reducing the energyconsumption of cities and their carbon footprint.

In addition, "smart and sustainable cities" models, integratingenergy-intensive technologies and using new advanced information and communicationtechnologies, will be one of the key drivers of energysector restructuring. A "smart" city by investing in applied good practicesthat have succeeded in reducing its energy footprint by changing the model of mobility by limiting the private car and investing in ICT-IS <u>with the help of smart andprudent</u> management of natural resources and supporting participatory governance at the same time enhances sustainable economic growth and improves living standards. The use of "smart" instruments atLISE level improves people's living conditions, attracts local investment and increases real estate values.

The<u>interventions that reshape the city are also smart meters and the external ENDSs **to** help change, help with the findings, help reconstruct lawsand decisions, allow</u>for the monitoring and management of the large amounts of information that will be needed for their harmonious operation andhelping end consumers to make rational use of energy in cities. In additionto the new regulatory framework of the demand response mechanism and energycommunities, the role of cities and citizens in the transition and ultimately in the restructuring of the energy sector is expected to be significantly promoted. In addition, the use of “intelligent” applications is also intertwined with urban regenerations, with the main aim of improving the living standards of residents and the operating conditions of businesses orbusinesses.

Urban bio-climate regeneration relates to prudent management of consumption of land, the use of cold or photocatalytic coating materials in public spaces, the proper management of water in public spaces, the control of electricity consumption to illuminate communal areas, the use of renewableenergy sources in thecity (in private and public spaces), smart waste management, green roofs, green walls, promoting the construction of low and nearly zero-energy buildings, promoting the upgrading of the building elements and installations of existing buildings (so that they do not burden their surroundings and become less energy-intensive), creating neighbourhoods with car-free indoor roads, measures and actions to reduce urban noise from transport (note thathome tones may not exceed max Lden, Lnight), the implementation of cycling infrastructure, pavements, the increase of open public spaces, the control ofsystems for promoting sustainable mobility and parking, equippingpublic spaces with technological information applications, and implementing publicawareness and environmental wake-up facilities. In addition, sound urban and architectural bioclimate planning and the use of sustainable materials in bioclimate planning (cool materials, shading structures, vegetation)are key prerequisites for the sustainable development of cities. Individual actions to strengthen urban green areas, such as the creationof green routes and urban green canyons with appropriate afforestation of roads, urban gaps, poplarpublic spaces and squares, the protection and development of streams, rivers, bedsand the regeneration of the Annexes, rivers, rivers, rivers and coastal areas; as well as the use of modern cold materials and technologies that are highly reflective in solar radiation and lead to energy savings in the built environment, in particular the reduction of noise and waste in water consumption, are structural components of the sustainable development of cities andreduce thermal quantities and the energy and carbon footprint,significantly contributing to mitigating climate impacts and enhancing citizens’quality of life.

Especially as regards the serious saturation problems faced by cities due to the increase in vehicle traffic, generous changes will be needed in order forGreece to meet the European objective, which is to reduce the use of the car, with much greater traffic from public transport, cyclingand walking. It is underestimated that the three above modes of mobility are the pillars of sustainable mobility and their importance is not onlysocial, economic and environmental. It is nowadays that due to the hostile environment prevailing on the narrow roads, which trap pollutants and noise, and the very narrow pavements, people with disabilities and people inneed have been removed. For these public open spaces are no longer accessible. Serious difficulties are also encountered by elderly people and children and those who arewalking, such as public transport users. It should also be noted that, in the absence of such infrastructure, the proportion of cyclists is negligible. Pending – a major project to improve public transport and promote its use throughtraffic restrictions and reduction of the width of road surfaces. This will lead to the widening of pavements and bike lanes.

At the same time, public spaces, streets and squares will become more attractive for pedestrians and this will significantly enhance the overall economy of cities and visitor attendance. The lowering of the speed threshold from 50 to 30 km/hwill play a major role in sustainable mobility. This will form low-circulation hives, i.e. socialisation hubs that will help improve the quality of life and better mobiliseresidents in the face of the climate crisis.

As part of a holistic approach, smart governance systems help streamline city management processes by promoting effectivecommunication, cooperation and engagement of citizens, ultimately strengthening the successful adoption of policies, measures and mechanisms at local level. The aim is to support the corresponding integrated actions with the active involvement of public and private bodies operating locally and to integrate the abovepriorities into urban planning.

The implementation of energy efficiency improvement measures, which were included in the policy priorities for improving energy efficiencyin buildings and industry, including electricity and gas infrastructure, also contribute to reducing greenhouse gas emissions and thus slowing down climate change. In addition, the production of heat from HECHP plants and the promotion of district heating to cover buildings' thermal ventilators, as well as the use of waste heat for energy production, leads to a reduction in greenhouse gas emissions due to lowerconsumption of petroleum products and other conventional fuels.

Given the ever-increasing tourist flows and the expansion ofthe tourist season, which increases and diversifies energy levels,as well as the environmental and carbon footprint of this sector, the focus will be on establishing rules to control and mitigate the impact. Adetailed description of all policies and measures for the energy transition of the tourism sector is described in section 6 of this chapter.

3.1.10 Summary of policy measures

The table below summarises the policy measures envisaged for greenhouse gasemissions.

Article	Policy measure name	Correlation withpolicy priorities	Target	Affectedparty	Type ofmeasure
M1	**Withdrawalof lignite-fired-power plants**	**PP1.1**	Reduction from GHG-transmitters	Generationof electricity	Regulatory, Technical measure
M2	**Evacuation of conductor-electrode from minerals fuels on islands, through interconnection of autonomous island systems and development of hybrid systems**	**FP1.1, FP1.2, FP2.3**	Reduction from GHG-transmitters	Generationof electricity	Regulatory, Technical measure
M3	**Promotion of RES,storage and production compartments of fuel from RES**	**FP1.1; FP2.1; FP2.2; PP2.3**	Reductionof non-ETS GHG emitters	Electricitygeneration energy Heating and cooling of the transport sector	Regulatory, Technical, Home legal measure
M4	**Reduction in quantities of biodegradable — of waste**	**FP1.1, FP1.6, FP1.9**	Reductionof non-ETS GHG emitters	Total sectorsfor privateconsumption	Regulatory, Technical, Home legal measure
M5	**Improving energyefficiency in buildings,industry and infrastructure**	**FP1.1; FP1.8; FP1.9; PP1.10**	Reductionof non-ETS GHG emitters	Total sectorsfor privateconsumption	Regulatory, Technical, Home legal measure
M6	**Electrification of the pelvic-fleet vehicles, taxis and lightweighttrucks (vans) through acquisition and paintingincentives**	**PP1.3**	Reduction EC transmitters in the sector of the transport	Lightweight roadtimes	Financialmeasure
M7	**Adoption disincentives for the use of oldfluvial or conventionalfluid**	**PP1.3**	Reduction of-transmitters in the sector of the	Lightweight roadtimes	Regulatory
M8	**Introduction of measures to green thesupply chain**	**PP1.3**	Reduction of-transmitters in the sector of the	Light/heavyown transport	Financial/Negative measure
M9	**Replacement of old bus technology in Attica with vehicles**	**PP1.3**	Reduction of-transmitters in the sector of the	Road passenger public transport	Financialmeasure

	low-emission (electriccar)				
M10	**Implementation ofa programme for more efficient use of the bus fleet through planning/reprogramming of the services based on-environmental criteria.**	**PP1.3**	Reduction of-transmitters in the sector of the transport	Road passenger public transport	Standard/Technical
M11	**L-typefleet electrification**	**PP1.3**	Reduction of-transmitters in the sector of the	Civil travel microkinetic capacity	Financialmeasure
M12	**Establishing measures to promote sustainable urban mobility and active mobility**	**PP1.3**	Reduction of-transmitters in the sector of the	Civil travel views	Regulatory-measure
M13	**Introducing measures to improve road muscleto promote alternative forms of travel**	**PP1.3**	Reduction of-transmitters in the sector of the transport	Civil travel microkinetic capacity	Regulatory-measure
M14	**Development of a network-of deliberately accessible-substructures for electric vehicle charging structures**	**PP1.3**	Reduction of-transmitters in the sector of the	Lightweight roadtimes	Financial/Negative measure
M15	**Creation infrastructures charging within the control**	**PP1.3**	Reduction of-transmitters in the sector of the	Road passenger public transport	Financial/Medium measure
M16	**Electrification ofwoven railway lines on the OSE network**	**PP1.3**	Reduction of-transmitters in the sector of the	Railtracks	Technical,-economic measure
M17	**Manufacture young people e — railwayrailways used to movethe road to rail**	**PP1.3**	Reduction of-transmitters in the sector of the transport	Railtracks	Technical,-economic measure
M18	**Aid coastal shipping publicservice connections using**	**PP1.3**	Reduction of-transmitters in the sector of the	SeaTransmission	Technical,-economic measure

	'green' ships with zero-emissions of gaseous pollutants				
M19	**Electrification ships during the berth period**	**PP1.3**	Reduction of-transmitters in the sector of the	SeaTransmission	Technical,-economic measure
M20	**Planning and integration of-renewable energies in port areas in the form of self-generation.**	**FP1.3, FP2.3, FP2.8**	Reduction of-transmitters in the sector of the	SeaTransmission	Technical,-economic measure
M21	**Electrification basic for the consumption oflakes**	**FP1.3, FP2.8**	Reduction of-transmitters in the sector of the	SeaTransmission	Technical,-economic measure
M22	**Aid local Da electricitycups and substations inthe port area**	**FP1.3, FP2.8**	Reduction of-transmitters in the sector of the transport	SeaTransmission	Technical,-economic measure
M23	**Financial aid –supportfor the energy transformation –-electrification ofthe ponds with the helpof EU instruments**	**PP1.3**	Reduction of-transmitters in the sector of the transport	SeaTransmission	Financialmeasure
M24	**Development Schedule portManagement Plans and Studies**	**PP1.3**	Reduction EC transmitters in the sector of the	SeaTransmission	Regulatory-measure
M25	**Strengthening the connectivity and capacity of the Greekislands**	**PP1.3**	Reduction of-transmitters in the sector of the	SeaTransmission	Technician,eco, normal measure
M26	**Creation infrastructur es electricity supplyvia a standardisedfixed or mobile interface to in air vessels parked at gates or delimitedaprons**	**FP1.3, FP2.8**	Reduction of-transmitters in the sector of the transport	Airtimes	Regulatory,cost measures

M27	**Reduction of fluorinatedgas emissions**	**FP1.1, FP1.3**	Reductionof non-ETS GHG emitters	Industrialdishes Schemes cooling, air-conditioning, fire-protection	Regulatory-measure
M28	**Reducing emissions in the agricultural sector**	**FP1.1, FP1.5**	Reductionof non-ETS GHG emitters	Agricultural sector	Regulatory,-economic
M29	**Sustainable management of-bees**	**FP1.1, FP1.6**	Reduction from GHG-transmitters	Forestry sector	Regulatory,-economic
M30	**Promoting a circularhouse**	**FP1.1, FP1.7, FP1.9**	Reductionof non-ETS GHG emitters	Total sectorsfor privateconsumption	Regulatory,-economic
M31	**Measures toreduce emissions totourism**	**FP1.1; FP1.2; FP1.4; PP1.9**	Reductionof non-ETS GHG emitters	Tertiary sector – Tourism	Regulatory,-economic
M32	**Developing smarttowns and promotingsmart andtax-taxing cities**	**FP1.1, FP1.8, FP1.9**	Reductionof non-ETS GHG emitters	Total sectorsfor privateconsumption	Technical facilities, Home legal measure
M33	**Urban bioclimatic-landscapes**	**FP1.1, FP1.8, FP1.9**	Reductionof non-ETS GHG emitters	Buildings sector	Regulatory,-economic
M34	**Development of smart-systems dermal written**	**FP1.1, FP1.9**	Reductionof non-ETS GHG emitters	Total sectorsfor privateconsumption	Technical facilities, Home legal measure
M35	**Climateadaptation measures**	**FP1.1, FP1.3**	Adaptation to-climate change	Total sectorsfor privateconsumption	Regulatory, Technical, Home legal measure

Table 24 Policy measures

3.2 renewable energy policies and measures

Achieving the target of 44 % set for RES as a share of total gross energyconsumption for 2030 requires the development of regulatory and techno-economicpolicies and measures with a specific timetable. Measures aimed at the penetration of RES into new uses and sectors, the energy couplingof sectors and ultimately the electrification of final consumption.

The share of RES in the country's electricity generation sector for the years 2019 to 2022 showed a significant increase from 33.14 % to 43.31 % and is expected to increaseonly in the coming years. The high investment interest in developing newRES for the period 2023-2030, combined with the rate of project development observed over the last four years, ensures the achievement of the new higher targets set, but also highlights significant needs in supporting, expandingand upgrading Greece's electricity transmission and distribution network in order to integrate the required projects into the system reliably and safely. To this end, additional policies and measures are being launched to optimise the management of the green energy produced.

The policy measures for the promotion of RES in the period 2023-2030 aim to cover eight different policy priorities (FP2.1-FP2.8), which are presented in Figure 8 below and which cover all sectors that may be developed.

All policy measures are described in detail for each Policy Priority in the following sections.

FP2.1: Reforming a licensing framework and updating the special spatialspace for RES – Acceleration, digitalisation and efficiency of licensing

FP2.2: Ensuring that RES and Storage Investments are implemented – Extension of SchemesActive Aid – Promotion of bilateral contracts

FP2.3: Promoting dispersed RES systems, Hybrid island systems and empowering local communities and consumers

FP2.4: Ensuring the sustainability and liquidity of the mechanism for granting operational splitting to RES powerplants and storage plants

FP2.5: Development and strengthening of energy networks and optimal integration and operation of RES plants – Energy storage

FP2.6: Ensuring minimum RES participation in meeting energy needs in the building sector – adaptations to the building regulation – promotion of energy sharing

FP2.7: Promote the use of RES systems to cover heating and cooling needs

FP2.8: Promotion of new technologies and coupling of energy sectors with a focus on making-maximum use of domestic renewable energy potential

Figure 12 Policy Priorities for the promotion of RES in 2023-2030

3.2.1 Measures and policies to implement the reformedlicensing system and update of thespecial regional framework for RES – Accelerating, digitising and effective permitting

The updating and more efficient implementation of both the token and the time-taxonomic-framework for RES are assessed on an ongoing basis, also incorporating the provisions of the European Directives. The ultimate objective of this process is to authorise and ultimately implement the RES plants required to meet the energy and national targets.

The aim is to further shorten permitting times for the installation of an RES plant, step up investment and strengthen the climate of confidence in the West of the State, thus attracting even more investment to thefuture.

Simplified licensing proceduresand shortening the response times of the services, the defined preconditions forimplementing the various licensing stages set for investors, and the completion and full operation of the RES information system carried out by the Ministry of the Environment and Energy for the digitisation of licensing procedures, the subsequent licensing of an RES plant, the interoperability of the individual systemsand the existence of a point of contact – service for a single phase – where the investor can now turn to all licensing issues.

At the same time, in the specific spatial planning framework, the categories of areas in which all or part of the installation of RES plantsare permitted or excluded will be known in advance, and the conditions for the installation of such plants will be laid down, taking into account criteria such as nature, environmentalprotection, carrying capacity and anthropogenic activities of each site.

Particular attention will be paid to the balanced distribution and coverage of available land for the development of new RES plants. Demarcated areas (‘Go to areas’) within which RES projects to be sited will be assessed on the basis of a defined authorisation procedure and within a predefined timeframe will be determined following an environmental and a floodassessment.

In particular, for photovoltaic plants, ‘priority areas’ will be defined from the total permitted use and available land,taking into account forest land and agricultural land.

Accordingly, for wind power plants, the exclusion areas will be updated and the carrying capacity will be redefined, taking into account the environmentalparameters.

In addition, the possibility of dual use of available grazing and cropland land will be assessed, which will allow the installation of photovoltaic plants and at the same time maintain and expand agricultural activities. In order to implement this measure, it will be necessary to establish a specific framework for the token, development and reinforcement of agrophotovoltaic plants, their installation in specialstructures and the type of crops that can be grown at the same timeand the collaborative schemes that will have to be developed between RESproduction and the agricultural sector.

In addition, a specific regulatory (token and support scheme) and a rotaxonomicframework for marine wind farms as well as floating photovoltaic parks will be defined.

3.2.2 Measures and policies to ensure the implementationof RES investment and storage – Extension of operational aid schemes – Promotion of bilateral contracts

In the period 2023-2030, RES will play a leading role in the domestic energy mix, while especially in the domestic electricity sector already in 2025 their share is estimated to be above 58 %.

The existence of a support scheme for the granting of operating aid to RES plants will continue either through competitive bidding procedures or outside the tragonistprocess for RES plant technologies which do not require a tender procedure. A corresponding support scheme will apply to RES plants with a storage system.

In particular, the framework of competitive procedures will be extended in the coming years, covering where necessary the specificities of the national energy system and the parameters of a reformed licensing framework, enhancinginvestment interest and always ensuring a level playing field between interested parties.

The extension of the aid scheme already approved (SA.60064) is considered necessary to ensure the smooth financing and implementation of the projects and to facilitate the necessary investment decisions.

While the continued rapid reduction in levelled generation costs for commercially more mature and competitive RES technologies makes the investment viable without the need for State aid, the operating aid scheme involving the plants in competitive tender procedures through Contracts for Differences (CfDs) provides investmentsecurity conditions by severely limiting the risk of participating in a market thatwill be dominated by practically zero variable cost generation.

In addition, the framework for the participation of RES projects directly **in the electricity markets and the conclusion of bilateral contracts will be further strengthened,** so that these plants, without receiving operating support, will participate in the energy market to recover part of the investment, and in order to ensure a stable flowof revenue and insurance of bank financing, they will conclude bilateral contracts with suppliers, consumers and Cumulative Representation Bodies (RES). These contracts will provide final consumers or suppliers with a tool tooffset the risk of fluctuating electricity prices and investment certainty for generators. Bilateral contracts will also be available via a digitalform where its administrator will be responsible for processing and clearing the transactions. The aim is to create the necessary liquidity in the market, shielding mutual benefits for participants and competitive prices.

Measures relating to the promotion of storage systems of short duration e.g. cumulative storagesystems

As mentioned above, the total capacity of combined accumulator storagesystems is expected to reach 3.1 GW by 2030.

This objective can be achieved either by individual power storageplants or by electricity storage systems integrated and operated in combination with RES plants.

A prerequisite for achieving the above objective is the completion of the implementation of the approved support scheme (SA 64736) for the installation of battery storage systems with a total capacity of 1.000 MW. 61

Electric space can also be used in an optimal way if electricity storage systems are combined with RES projects that are either already in operation or have received a connection offer that capture electricity space. In order to achieve this, an appropriate framework should be established for the addition of storage to produce the best techno-economic results.

The combination of storage and RES projects for the release of electric spaceis two ways. Either adding storage within the RES projects ‘behind the meter’ or creating cooperative schemes of RES plants and standalone energy storage stations which are attached to thesame location (same substation).

This could significantly increase the scope for receiving new RES projects. The release of electric space will depend on the entiregrid and storage system capacity added through such a framework and on the restrictions that can be imposed on the injection of energy from RES plants.

In order to achieve the NECP objective of installing 3.1 GW of electricitystorage stations, the aim will therefore be to extend the specific support scheme for capacity beyond 1 000 MW, and policies will also be adopted to promote the installation of RES plants with integrated storage.

In particular, it will seek to adapt the existing aid scheme (SA.60064) of RES plants with integrated storage for a capacity of more than 200 MW to allow for aid to be granted following a competitive bidding process for these projects and the possibility of extending the support programme for small domestic photovoltaic systems with integrated storage will be considered.

Measures related to the development and integration of electricitystorage with pumped storage technology

To date, aid has been approved by the European Commission for the installation of thepumped storage station with a capacity of 680 MW in Amfilochia (SA 57473).

In order to promote the installation of pumped storage stations and/or long-term storage stations of technologiesother than pumped storage stations, consideration will be given to

61 Given the significant deviation of the capacity of the SA 64736 support scheme from the 2030 target power (and the intermediate target of 2025), consideration will be given to extending it to higher power levels, depending on the evolution of storage system prices.

submitting a request to the European Commission's Directorate-General for Competition for the granting of aid (investment and/oroperational) following the participation of interested parties in a competitive pre-tenderprocedure.

3.2.3 Measures and policies to promote RES clusters, Hybrid island systems and strengthening the co-ownershipof local communities and consumers

The multidimensional contribution of dispersed production of RES systems isundoubtedly switched off. It is therefore imperative to implement and promote self-consumption schemes in accordance with the new institutional framework established by Law 5037/20223 and the incorporation of RED II.

This is achieved both by ensuring the availability of electrical space for thecondition of RES plants for self-consumption and by financing part of the installation to make this feasible and sustainable.

There is a special provision and a specific electric space of 10 MW per substation for self-consumption plants of up to 10.8 kW is reserved to accommodate theneeds of households, farmers and small and medium-sized enterprises, while the remaining available substations and the network are allocated 20 % to autopower plants and 80 % to otherRES power plants.

In addition, for households and farmers, the programme "Photovoltaic at TEGI" has been launched with resources from the Recovery and Resilience Fund andthe installation of battery photovoltaic plants to covertheir own needs through the application of energy compensation. This graph estimates theinstallation of more than 150 MW of small PV battery plants.

Similarly, for businesses, the State will carry out a subsidy programme, with a total budget of EUR 160 million from the Recovery and Resilience Fund, for the installation of PV plants with a battery exclusively for self-consumption, and atthe same time the selection will ensure the necessary electrical space.

The aim is to support companies that are energy intensive enough, electricity costs are their main operating costs and the installation of the plant will make a significant contribution to reducing the absorption of electricity from the grid and thus reducing CO_2 emissions.

The promotion of dispersed production and self-consumption will be further enhanced through a specific framework to be established for the installation of photovoltaic plants in buildings, simplified procedures for connecting them andcollective self-consumption, while also exploiting available electric space in the urban fabric. The actions will be strengthened through a specialself-consumption register established by the Network Operator and the promotion of ‘energy coaching’ in order to shape active consumers and optimise energy habits.

At the same time, renewable energy communities and citizens’ energy communities will also play an active role in the implementation of policies to promote RES in final consumption.

With a view to strengthening the role of local communities and consumers, we will, before-implementing specific actions and granting investmentaid, and provide effective support for the development, construction and operation of RES plants with a view to reducing the electricity costs of first-tier and second-tier local authorities, DEYAs and Land Improvement Organisations, as well as covering all electricity consumption of energy vulnerable households. EUR 100 million from theRecovery and Resilience Fund and other available financial instruments will be used to implement the actions.

The Communities’ contribution to the promotion of self-consumption is key, as they can bring together a large number of consumers from the sameregion or differential region, manage their consumption as a whole, and, on the basis of the consumptionprofiles, meet their needs by means of virtual self-consumption from an RES plant, thus reducing their energy costs.

To this end, a specific technical assistance and advisory mechanism will be established to support the Communities, to further promote them on the ground, to identify and eliminate obstacles to their development andto simplify and update the institutional framework governing them.

As regards further decarbonisation of islands, an important programme fromthe GR-eco Islands programme, which aims to transform them into green economy models, energy self-sufficiency, digital innovations and sustainable mobility. The programme was initially launched by the islands of Tilos, Agios Efstratios, Astipalaia and Halki and will be enlarged to a further 36 small islands, namely: Symi, Agathonisi, Megis,

Arkioi, Maravali, Kasos, Psyrimos, Glass, Leipzi, Telendos, Nitrios, Megonisi, Oinoussa, Psara, Fournes, Thymnas, Amorgos, Anafi, Donysa, Irakleas, Antiparas, Schinousa, Ios, Sichinos, Koufonisi, Folegiros, Therasia, Kythnos, Kimolos, Sifos, Sifnos, Kea, A-Nticythira, Gavidas, Ereikoussa and Othonnes. The programme is implemented with the support of EUR 100 million from the NSRF 2021-2027 and will be supported by resources from the Reduction Fund.

The installation of hybrid systems in the 28 autonomous island systems and in the low-interconnected system in Crete will be promoted through astate aid scheme, in order to achieve ‘green’ electricity generation in orderto achieve the objective of limiting the use of liquid fuels in the electricity generation sector.

It is worth noting that Greece has succeeded in introducing a special arrangement in the revision of Directive 2018/410, which guarantees free CO_2 allowances for the decarbonisation of islands. These allowances have to beused between 2021 and 2030 and correspond to approximately EUR 2-2,2 billionat current CO2 prices (80-EUR 88/tonne). Greece activated this arrangement in 2021 and received the European Commission's approval in principle. In this context, the decarbonisation fund was created to manage the resources from auctions of unallocated CO2 allowances.

As regards the installation of hybrid systems, it is initially envisaged to include 240 MW of hybrid plants with a guaranteed capacity by 2026. Hybrid plants with a total limitedcapacity of 120 MW will be installed on non-interconnected islands, such as Rhodes, Lesvos, Kos, Megi, Antikythira, Gavda, Heikoussa, etc. The remaining hybrid plants with a total guaranteed capacity of 120 MW will be installed in Crete and will include pumped storage systems with wind plants with a guaranteed capacity of up to 50 MW, hybrid plants consisting of batteries with a guaranteed capacity of up to 50 MW and plants with a guaranteed capacity of up to 50 MW.

3.2.4 Measures and policies to ensure the sustainabilityand efficiency of the mechanism for granting operating aid to RES and storage plants

Since 1 January 2016, RES power plants have joined the electricity marketand have been included in a support scheme in the form of operating aid. The compensation of RES plants participating in a competitive procedurefor operating aid shall be paid from the Special Account for RES and HECHP. Part of the revenues from the auction of the country's CO2 emission allowances and revenues from their participation in the electricity market shall be credited to the account if the market price exceeds the price that the RES plants have closed through the competitive procedure for operating support. Since competitive procedures for the granting ofoperating aid to RES plants are driven to very competitive levels with pricesbelow the Day-Ahead Market, the account results in surplus for new RES projects. In any case, appropriate legislative and regulatory measures will be put in place to support the account by ensuring its liquidity and sustainability. Surpluses are expectedto cover also the needs for operating aid to storage plants.

The aid scheme will continue to be the main tool to support overall RES technologies for electricity generation as well as storage plants, while special provision will continue to be made for small installed capacity installations where operating aid for the type of fixed price will be applied. In this context, a specific mechanism and follow-up procedure isalready in place in order to adjust the reference value ofthe relevant RES technology and friends for projects not yet in operation, in line with developments in the financing and development and operation costs ofthese plants. Furthermore, the development of environmental markets through the use ofGuarantees of Origin for RES electricity is planned for the next period and isset to act as a complementary market mechanism, which will further contribute to the proper functioning of the Special Account. More specifically, the regulatory framework was completed in July 2022 and the first tender for Guarantees in the Greek system is planned by the PEAP.

3.2.5 Measures and policies for the development and strengtheningof energy networks and optimal integration and operation of RES plants – Energy storage

Electricity transmission and distribution networks play a key role in the high penetration of RES plants for electricity generation, which is why the planning and development of new projects by the Operators will incorporate the forecasts of penetration of new RES plants and plan the necessary requirementsand actions to implement it as seamlessly and smoothly as possible for the operation of the energy system. The Transmission System Operators and the Distribution Network shall designand ensure the networks with a view to the future development of RES plants, increasing geographical coverage and strengthening and technologically modernising the high-voltage and ultra-high voltage transmission system and distribution networks. Networks should therefore be developed in order to curb the maximum penetrationof RES as far as possible by limiting any cuts in the energy produced to a minimum.

In this context, the technically/economically optimal reinforcement and expansion of energy infrastructure in both the transmission system and the distribution network to address the saturation effects that hinder the further development of RES plants in specific areas will also be a key measure for the veal of RES inthe energy networks for the next period.

For example, the potential to increase the power of substations (additionof M/T) and to upgrade them more generally should be exploited. In addition, new regulatory models for the distribution of charges for new network and system development projects (in particular M/S) have been designed and implemented to facilitate the materialisationof such projects to connect small producers.

In addition, according to the results of the project being carried out, substations built by producers (mainly forwind power stations) could now be used to serve the distribution lines of the network, as in this case it would allow more RES plants to be connected to the grid, and the regulatory framework will have to be modernised in theseareas.

To this end, the Distribution Network Operator has already carried out studies to determine the aid to the distribution network, in terms of the number of HV/MT units that will be saturated and will require an increase, as well as theopposite distribution lines which will exceed the capacity to absorb RES and thus require aid. The aim of these studies is to develop amethodology to define the expected investment costs, to identify geographically critical intervention areas to strengthen the distribution network and to take account of the increments of electricity supply units for the purpose of serving demand for the simultaneous reception of new RES projects. In this context, relevant projects have already been included and are being implemented in the Recovery Resilience Fund.

In addition, the development of new financing models for the rapid deployment of the specific infrastructure will be launched, while management complexity and time delays due to external factors will be reduced througheffective planning and transparent consultation procedures.

A comprehensive legislative and regulatory framework is also under way to limit the injection into the grids of electricity produced by RES stops, with a view to making better use of the grids and maximising thedifficulty of absorbing energy from RES plants in areas with limited absorption capacity.

With a view to making even greater use of the other networks, consideration willbe given to the requirement that measures be taken for new stations toavoid burdening the electrical characteristics of the networks (e.g. short-circuit level), which must also be donefor existing stations that are radically renewing theoffline equipment. To address the serious technical problem of short-circuit levels, DEDDIE is already preparing a plan for the implementation of short and longterm measures.

With regard to the radical renewal of production equipment (repower), this will gradually become a priority with the completion of the shelf life of theunits in question, as the use of this RES potential in the areas concerned should be maintained or even increased, but taking into account the new environmentalconditions, the obligations to participate in the market and the need tostrengthen the networks.

In the context of the new interconnections between the autonomous systems of the NII andthe continental system, the utilisation of the existing local RES potential will be optimised, while taking into account both technical, economic and environmental andsocial considerations. At the same time, the implementation of interconnections will promote both the RES penetration targets and the energy security of the islands.

Further penetration of uncontrolled RES is expected to create new challenges for transmission and distribution system operators in terms of system operation due to the stochastic nature of production ofunits.

In order to limit cuts in renewable production to theeconomic minimum level, while ensuring uninterrupted supply to consumers, increased flexibility in the system is needed and therefore theimportance of sources of flexibility, such as storage, is further increased. In addition, for generators with an obligation to participate in the electricity market and to enter into an undertaking, the stochasticity of RES generation is an additional risk factor.

Storage systems are expected to play an important role in reducing the emergence and need for RES cuts in the system as a whole, to address local saturation problems, and to improve the capacity adequacy and flexibility of the system. The combination of RES units withenergy storage systems, i.e. when the common connection point is shared (storage is located behind the meter (behind-the-meter) or at a point in the distribution network downstream of the same connection point with the HV system), if no operational problems arise, may mitigate the impact of RES plants on the operation of the system by smoothing fluctuations in production.

The development of storage systems behind the meter will add electrical space to the grid as it offers the possibility to limit the injected energy during maximum generation hours, thus offering the possibility to absorb increased RESelectricity.

Among the benefits for system operators is the optimisation of network stabilitythrough the provision of ancillary services (e.g. control, frequency response and power quality), while at the same time increasing the ability of the network to accommodate new RES units through the provision of collegiate managementservices. For producers, the combination of storage and RES leads to a reduction in curtailment due to the inability to absorb the energy produced from the grid, while allowing for the provision of guaranteed capacity (Capacity Firming), allowingfor the containment of deviations from planned production. New pre-visionaryparticipation in additional energy markets, such as the balancing market and the Month Cross Capacity AdequacyCompensation Mechanism, are being opened, which implies increased profitability for the investment and a reduction in the need to strengthen it.

3.2.6 Measures and policies to ensure minimum RES participation in meeting energy needs in the building sector – adaptations to the building regulation – promotion of energy sharing

The potential for further RES penetration in buildings remains high, leadingto the adoption of specific policy measures for its efficient use. A key tool will be the implementation of a regulatory framework for the obligationto share RES in meeting the energy needs of the building sector (settingthe percentage of shares). In this context, the relevant building projections forzero consumption will contribute to the further penetration of RES applications in the building sector, taking into account techno-economic sustainability criteria,contributing to the achievement of the targets set in the context of improving the environmental-performance of the building sector.

Targeted solutions and regulations to promote the collective self-consumption of 'green' energy in residential complexes and share it among tenants are measures of first importance, as housing complexes are home to almost 60 % of the country's population.

The above provisions of the regulatory framework will be incorporated intothe revised Energy Performance of Buildings Regulation, and particular emphasis will be placed on the exemplary-role that public buildings used by the public sector must take on by setting minimum RES participation thresholds, taking into account thecriteria of economic viability and energy benefit. Particular emphasis will also be placed on removing barriers to installation of RES and storage systems in buildings through targeted adaptations of the Buildings Regulation.

In this context, maximising synergies will be sought both with the policy measure for the implementation and promotion of self-consumption schemes and with other policy measures concerning public and private buildings in the field of energy efficiency.

3.2.7 Measures and policies to promote the use of RES systems to meet thermal and cooling needs

The promotion of efficient heating and cooling systems is a key policy priorityfor achieving this objective combined with upgrading the building envelope. 17 % of residential buildings are expected to meet the positiveneeds with air-to-water heat pumps in 2030, while the corresponding figure in 2050 is expected to rise to 91 %. The increased penetration of heat pumps in the case of tertiary sector buildings is expected to be close to 69 % and 90 % in 2030 and 2050 respectively. In addition, support will be given to the coordinated promotion ofRES systems, such as thermal solar systems, contributing both to the improvement of energy efficiency and to the further penetration of RES for heating and cooling. There is also a contribution, albeit with a small share, from RES district heating networks using mainly geothermal energy, biomass andrenewable gases. An important contribution will be the contribution of Article 18 of the Climate Law (Law 4936/2022 (Government Gazette, Series I, No 105/27-05-2022)), which includes measures toreduce emissions in buildings, such as a ban on the sale and installation ofheating oil burners.

In the same vein, programmes for the installation of photovoltaic storagesystems for self-generation to produce electricity from renewable sources will be strengthened to meet thermal and cooling needs throughwater-grade pumps and reduce energy costs for consumers.

The promotion of the above efficient heating and cooling systems will increase the share of RES in heating and cooling, which is estimated tobe 46 % and 100 % in 2030 and 2050 respectively.

Promoting the use of bioenergy to meet the thermal and cooling needs of households and industries is an important step towards reducing dependence on conventional energy sources and reducing greenhouse gas emissions. Greece has a great potential for bioenergy development, as it has rich natural resources and alternative sources of energy that can be exploited. Measures for the use of local district heating networks withinindustrial districts that exploit waste heat from certain industries and craft industries to meet thermal needs close to others will be promoted. Specialised supportprogrammes will also be developed to develop efficient residual biomass and biodegradable material supply chains and to support and implement optimal environmental and energy-efficientapplications of bioenergy. A plan to incentivise the collection and utilisation of forest biomass on the basis of management studies isunder development. After the necessary processing, forest biomass will be disposed ofto compiled operators for use for energy production or other productsfrom the bioenergy sector.

3.2.8 Measures and policies to promote new technologies and the coupling of energy sectors with a focus on e-consumption to maximise the domestic potential of RES

Maximising the domestic potential of RES and promoting new spin-offs isa key concern of policy measures until 2030 to achieve the targets.

<u>Promoting the implementation of HSE projects</u>

As mentioned above, the NECP aims to install 1.9 GW of LAG projects by 2030.

In order to achieve this objective, a series of regulatory decisions and policy measures are necessary, as illustrated below:

- Drawing up the National Plan for the Development of Offshore Wind Parks (EPASYAP), which will determine the entire maritime space that is primarily acceptable for the relevant exploitation. The EPAYAP plan and the strategic environmental impact study accompanying it have been completed and should be submittedto the competent Directorates of the Ministry of Energy and the Environment.

- The selection of the first Offshore Wind Parks Organised Development Areas (POASE), through a pool of options of ten (10) potential areas with an estimated installed capacity of 4.9 GW, in which the first HSE projects will be installed. The first POASYAP will be delineated by the adoption of corresponding presidential decrees by the end of 2024 and will meet the target of 1.9 GW set out in the draft revised NECP. The selection pool of HSE projects will be continuously expanded and with new areas to meetthe ambitious objectives of the NECP.

- Carrying out studies and surveys to assess the need to strengthen thefacilities and other necessary infrastructure in the areas where the HSE projects are developed, the morphology of the seabed where the wind turbinesof the HSE projects will be installed;

- The approval by the European Commission of the aid scheme for HSE projects and its incorporation into the national legislative and regulatory framework. In particular, the aid scheme will provide for the granting of aid following the participation of interested parties in a competitive bidding process and the conclusion of 20-year operating aid contracts (CfDs). The first tenders for the award of aid are expected to be carried out by theRAAEY by the end of 2025, with the projects selected to be completed by 2030.

- Submitting a request to the Directorate-General for Competition of the European Commissionfor the granting of aid and speeding up the necessary authorisation procedures for the installation of the first pilot HSE project, with a total capacity of 600 MW, in the area of Alexandroupolis.

Promotion of other innovative RES technologies

In this context, innovative RES and RES technologies that have not been sufficiently exploited and can contribute to the further exploitation of this domestic potential will be primarily considered and promoted in the form of pilots. **Wave energy**exploitation projects, possibilities to develop floating photovoltaics, **green hydrogen production** are some of these applications for which there is a target to be further analysed in this light.

Particular reference should be made to the possibility of ***using RES systems forfoaming***. In particular, by carrying out the corresponding feasibility and cost/benefit studies, the use of small self-contained RES desalination plants will be promoted for the production of drinking water or to meet irrigation needs in islands andremote areas which remain without an electricity grid or have a weak grid and are characterised by severe water scarcity. Small stand-alone desalination plants will beadded up to cover their energy consumption with RES systems. Itsees small wind turbines and photovoltaic systems for electricity generation to be installed in reverse osmosis plants, whilein the case of thermal desalination plants, both lowenthalpy geothermal and thermal solar systems can be used. In addition, due to thelack of fixed capacity in desalination plants, the use of storage is requiredin order to increase the operating hours of the plant regardless of the availability of RES. In any case, desalination plants will contribute to localdevelopment, reduce the use of bottled water at high environmental costs due also to the lack of recycling in most of these areas, reduce the problems of large electricity grids, the seasonality of water needs and reduce GHG emissions due to the limitation of the operation of local power plants while the islands concerned remain unconnected to the mainland system.

As regards geothermal energy, the regulatory framework for its use has recentlybeen completed and the call for interest for the lease of geothermal exploration rights in four areas of Central Ki– Eastern Macedonia and Thrace is under way. In this context, it is evident that the introduction of specific incentives for the development of projects for the exploration and exploitation of high temperature geothermal fields and the implementation of an effective licensing system are apriority for the development of the national policy in the field of-geotheter. Accordingly, it is of utmost importance to design and adopt specificmeasures to inform local communities in areas with important geothermal fields.

In this regard, coupling the energy sectors to enhance the optimal penetration of RES is also a priority, as it contributes tothe use of electricity generated from RES to meet demand for heatingand cooling and load taking in transport.

The gradual electrification of final consumption sectors enables the coupling of the energy sectors and achieves a higher share of RES at the levelof energy consumption. In particular, sector coupling refers to the possibility oflinking the power generation sector to different energy sectors, such as power-to-Heat, Power-to-Gas andTransport.

The coupling of energy sectors provides additional flexibility to the system,increasing the potential to absorb production from RES plants. Combined with storagefacilities and intelligent energy management systems, the consumption of flexible loads may be deferred in order to maximise the wasteof energy from RES. Coupling the electricity sector with the heating and cooling sector, through energy-efficient heat pumps, is already aneconomically interesting approach, and there are other possibilities for converting electricityinto positive energy and its subsequent storage.

Similarly, the potential for the coupling of the electricity and gas sectors, through storage applications by converting electricity into renewable gas, through the production of green **hydrogen** are equally important. Gas, produced using RES energy, can be injected into the existing gas networkand used as a fuel for heating buildings or used (synthetic fuel) in transport.

3.2.9 Summary of policy measures

Numbering	Policy measure name	Correlation withpolicy priorities	Target	Affected sector	Category of Measure
M1	**Competitive dispute commercially mature RES technologies andstorage stops**	**FP1.2, FP1.4, FP1.5**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory, Financial Measure
M2	**Development of new RES projects without the need for State aid, throughmarket symmetry andthe conclusion-of bilateral contracts to ensure their viability**	**PP1.2**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure

M3	**Extension of aroll-over scheme with dynamic-adjustment of operating aid for newstops ofindividual RES artists andcombination of RES plants withstorage**	**FP1.2, FP1.3; FP1.4, FP1.5**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure
M4	**Promotion of installation –-stand-alone systems – Extension of a support scheme**	**FP1.2, FP1.5**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure
M5	**Developing and supporting innovative and pilot projects as wellas super-building wind farms with highdomestic value**	**FP1.1, FP1.2; FP1.3, FP1.5**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Financial measure
M6	**Guaranteed liquidity ofno operational splittingof RES units and storage units with optimum structure ofinput machines**	**PP1.4**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory, Financial Measure
M7	**Growth environmental of markets with the use of guaranteesof origin for the productionof RES**	**PP1.4**	Increase ofproxy eu RESIncrease of RES for heating and cooling Increase in RES intransit	Production the-vertebrate e heating energetic – cooling Field ofactivity	Regulatory, Financial Measure
M8	**Implementation and digitisationof the reformed token framework**	**PP1.1**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure
M9	**Updating, simplifyingand optimising the functioning of thespecific spatial context**	**PP1.1**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure

M10	**Token andspatial framework for marine wind farms**	**PP1.1**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Regulatory measure
M11	**Promotion of dispersed RES production through self-consumptiongratings and the use offinancial tools**	**FP1.3, FP1.6; PP1.7**	Increase ofproxy eu RESIncrease of RES for heating and cooling	Production the-vertebrate e heating energetic – cooling	Regulatory measure
M12	**Support for thedevelopment of renewable RES projectsby Energy RenewalCommunities and NewCultural Communities through the useof specialisedfinancial tools**	**FP1.2, FP1.3, FP1.6**	Increase ofproxy eu RESIncrease of RES for heating and cooling	Production the-vertebrate e heating energetic – cooling	Regulatory measure
M13	**Decarbonisation of the non-interconnected islands through the installation and reinforcement of Hybrid Plants**	**FP1.1, FP1.3**	Increase ofproxy eu RESIncrease of RES for heating and cooling	Production the-vertebrate e heating energetic – cooling	Regulatory measure
M14	**Strengthening energy-structures to copewith JEPs-(transmission and distribution networks) and thedevelopment of new-financial models for the-deployment of such infrastructure. Forecast optimum utilisation ofnew interconnections of the NPE.**	**PP1.5**	Increase ofproxy eu renewable-energy citus	Production the-vertebrate e Nergia	Technical my metre
M15	**Reform of the energy efficiency regulationfor electricity, with the participation of RES in the coverageof building sector ranges**	**PP1.6**	Increase ofproxy eu RESIncrease of RES for heating and cooling	Production the-vertebrate e heating energetic – cooling	Regulatory measure

M16	**Promotion of RES inpublic buildings**	**PP1.6**	Increase ofproxy eu RESIncrease of RES for heating and cooling	Production the-vertebrate e heating energetic – cooling	Regulatory measure

Table 25 Estimated policy measures for the promotion of RES.

3.3 the development of alternative and climate-neutral gases and liquid fuels

The penetration of RES in electricity generation and the substitution of naturalgas by electricity in the heating and industrial sectors is leading to agradual reduction in the overall consumption of gaseous fuels. At the same time, traded natural gas will be transformed into a blend with renewable gases. The main strategic option of the NECP is to gradually reduce the consumption andcarbon footprint of gaseous fuels.

3.3.1 Measures and policies for the development of biomethane

According to this NECP, biomethane will be 2 030 TWh/year in 2,1 and 2 050 TWh/year in 9,7.

In order to produce the potential of this biomethane, the institutional scale is already being prepared, with a view to completion in 2 in^{Q2024}, along the lines of:

- The upgrading of existing biogas plants into biomethane plants, atleast those adjacent to gas distribution or transmission networks. It is estimated that more than half of today's biogas plants can be converted into biomethane production.
- The establishment of new biomethane plants, in particular in agricultural/livestock areas;
- The injection of the biomethane produced into natural gas distribution networks (or gas transmission pipelines where this is cheaper), with a view to greening the natural gas. According to this NECP, the share ofbiometa in the gas distributed will reach 10.8 % in 2030 and 20.4 % in 2050.
- The establishment of a framework for the connectivity of biomethane plants with-distribution or transmission toes, under the supervision of the Regulatory Authority (RAAAR).
- The possibility of converting the biomethane produced into compressed orliquid biomethane for use in transport.

- The creation of a State aid framework to implementthe further production of biomethane by the private sector, given that the cost of biomethane produced is currently 50-100 % above the average natural gas price in the coming years (the latter is estimated at EUR 40-50/MWh). The framework will be based on competitive procedures and willreceive investment and/or operating aid for a certain period of time with the system of financial differences against the price of natural gas.

- The issuance of renewable gas certificates for the establishment of a relevantfield. The certification body has already been designated.
- The use of captured CO2 in the production of biomethane, for the production of synthetic fuels.
- The organisation of a raw material collection system for the production ofbiomethane, with the assistance of local government, and consideration of a system of incentives including the disposal of solid residue from biomethane factories for use as fertiliser.
- According to all the data, the decisive point for the development of thebiomein is the collection of the raw material. Biogas factories are currently producing52 % of their capacity on average due to a lack of raw material.

INSTITUTIONAL FRAMEWORK

A study on the development of biomethane production in Greece is being finalised. The study includes the proposed State aid schemes. The studyplan will be subject to consultation with the stakeholders (biogas parks associations, gas network operators, natural gas suppliers, etc.) with a view to its completion by the end of 2023. A summary of the study, together with the chapter on measures and policies, can be the National BiometePlan.

Legislation on the development of biomethane production is also under preparation. Pre-literacy includesa restricted consultation of the draft law with stakeholders, followed by an open public consultation. The aim is for DG COMP to complete the legislation and approve the State aid scheme by the end of the 1th quarter of 2024, while by the end of the 2th quarter of 2024 thefull selection of secondary legislation (programme guide, required RAAEY decisions, etc.).

Separately, the collection of raw material for the production of biomethane will be studied, with a view to formulating additional measures and policies by the end of 2024 in cooperation with the Local Government and the Ministry of Rural Development andFather.

The issue of the organisation of the certification mechanism for renewable gases by the RAP in accordance with EU legislation and the market organisation of relevant‘leeks’ certificates from the ERA is another important measure planned to be completed by the end of 2024.

3.3.2 Measures and policies for the development of hydrogen

Proposed policies:

I. Support scheme for green hydrogen pilot projects

In order to acquire know-how on the production of green hydrogen, as well as to develop the national market for green hydrogen, the initial implementation of a limited number of small and medium-scale projects makes sense. The jointprojects can, in a subsequent phase, be developed in green hydrogen projectswith glass-scale. However, in order for these projects to become commercially viable, financial support is needed. It is therefore envisaged to implement each supportfor green hydrogen pilot projects, which will act as a catalyst for the development of local, regional and national green hydrogen value chains. Financial support under this measure is estimated to be given in the form of investment aid for the cost of installing electrolysis systems, which will produce green hydrogen from renewable electricity, in compliance with the requirements established by European legislation.

II. Support scheme for scaling up green hydrogen production

In order to achieve the ambitious targets outlined in the NECP for 2030, amanoeuvring increase in the installed capacity of electrolysis systemsused for the production of green hydrogen must take place in the coming years. At the same time, the cost of producing green hydrogen is estimated to remain higher than the production costs of the corresponding fossil fuels. This states that at least until 2030, there will be a need for financial support to incentivise the production of green hydrogen so that its costs are competitive with the cost of fossil fuels. In the longterm, the cost of renewable electricity and the cost of electrolysis systems are expected to decrease to such an extent that cost parity with fossil fuels can be achieved. It is therefore envisaged to provide an economicstimulus for the medium-term scaling up of the production of green hydrogen inEl El, in order to facilitate the achievement of the respective national targets by 2030. Given the weight of operating costs to the final cost of the green hydrogen produced, in particular electricity costs, the focus of the measure is on providing financial support for the production of green hydrogen itself (e.g. operating aid). In this way, the maturing measurewill not only support the installation of the required capacityto produce green hydrogen, but also the production of green hydrogenat a cost that can then be used to decarbonise the different demand sectors in Greece. The challenges here are the availabilityof resources that will need to support the scaling up of green rogen production onan annual basis, as well as the technical and economic maturation of rogen usesin sectors that cannot be electrified (e.g. industry, transport), in order to ensure the absorption of hydrogen and the added value of the whole hydrogen chain in achieving the climate objectives.

The financial support model of the European Hydrogen Bank is a good starting point and its experience will be properly exploited. It is planned to use the infrastructure of the European Hydrogen Bank to highlight projects that will benefit from State aid.

III. Blending quota obligation for transport fuels

Financial support for the production of green hydrogen is estimated to reduce the cost of this hydrogen and thus incentivise the replacement of fossil fuels. However, this support may not be sufficient to promote the large-scale deployment of hydrogen, also due to persistent severe difficulties, such as the need for investment on the demand side. For this reason, the development of the green hydrogen market in Greece would also require the introduction of appropriate demand-side support tools.

The quota obligation for green hydrogen consumption is seen as a very effective mechanism for the development of the green hydrogen market. These obligations will be incorporated into national legislation and specificcategories of consumers will be required to cover a minimum share of their consumption using green hydrogen orRFNBO. Under European legislation, a number of indebtedquotas have already been introduced in respect of the minimum share of RFNBOs, in several parts of theyear. In particular, for industry, the share of hydrogen used for final energy and non-energy purposes must be at least 42 % in the RFNBO category, i.e. green hydrogen, by 2030. This percentage shall increase to 60 % by 2035. For the voltage sector,the minimum share of RFNBOs should be equal to 1 % in 2030. In particular, for the aviation and coastal shipping sectors, this target is projected to be increased, reaching 1.2 %. The transposition of the above-mentioned Europeanlegislation into Greek law will also constitute the legal basis for the introductionof mandatory quotas for the consumption of RFNBOs in the transport sectors, including aviation and coastal shipping, as well as industry, which is very important as these sectors are considered to be the most difficult to decarbonise.

The quota obligation for the blending of low carbon footprint fuels in transport fuels is imposed on suppliers of fuelson the wholesale market. The technical details are similar to the way inwhich blending quotas for biofuels are applied. This is the same measure, extended to renewable fuels of non-biological origin. The candidate fuel types are renewable liquid and gaseous fuels. A key condition for theapplication of the quota measure is the establishment of a reliable certification, monitoring, information and confirmation mechanism.

The obligation of mixing quotas is a measure which makes it possible to predict how tolive in a certain way. This leverages investments in the production of newhydrogen (and other renewable fuels).

The quota obligation measure will lead to significant increases innaliser prices as climate neutral fuels are still much more expensive than substitute fossil fuels. To avoid negative side effects, it may be appropriate to subsidise the price of climate-neutral fuels and to exempt them from taxes. In addition, the special taxes on tankering andcarbon pricing of fossil exhaust emissions should be maintained orextended. It is certainly a challenge to finance this exercise.

IV. Aid for the deployment of green hydrogen infrastructure

The development of a green hydrogen market will require the full development of-substructures for the transport and storage of green hydrogen in pure form. However, at that point in time, due to the lack of completion of the technical and economic maturity of the relevant technologies in the hydrogen use sectors,it is not clear that hydrogen (gas or liquid products) will be required to be disposed of. Without knowing the required quantities and the topology of hydrogen production and use both inside and outside the country, it is not possible to plan the pipelines (routing, dimensioning, etc.). In principle, both investment and operational costs of energy infrastructure must be covered by the users of such infrastructure, in particular through related network charges. However, if the question of volumes and users is clarified to some extent, an additional important challenge for the construction of hydrogen infrastructure is the fact that there will be few users of this infrastructure during the initial stages of the development of the green hydrogen market. This would end the existenceof prohibitive user charges for the initial users of hydrogen infrastructure. For this reason, additional support for the construction of the requiredhydrogen infrastructure is being considered, of course the challenge of resource availability. In this context, a temporary shift inrecovery of hydrogen infrastructure development costs to future years of use could also be assessed. Alternatively, the pipeline network may be replenished undera third party access exemption regime for an appropriate period of time combined with long-term production and sales agreements of the product. This gas has been used to develop natural gas infrastructure that caters newareas and is provided for in EU legislation.

V. **Priority Projects deserving Investment Subsidy**

The criteria contributing to the selection of hydrogen projects are briefly as follows:

- the consumption destination of the hydrogen
- How to produce the electricity needed to produce hydrogen

- investment leverage potential
- integration of production with supply chain infrastructure
- the impact on employment and added value for the domestic economy.

In the above context, some of the above criteria are specified below:

1. **Destination of the hydrogen produced**

The injection of hydrogen into the natural gas transmission and distribution networks is technically possible and permitted under Law 5037/2023 (Article 105). However, this use of the rogenis considered an inefficient and very costly way to decarbonise. The reduction in the carbon footprint of natural gas on a calorific basis is 1.6 % for blending hydrogen 5 % v/v (CO_2 reduction during use), while the cost of producing hydrogen is currently around three times the estimated gas prices. Giventhe large need for State aid for the enduringtransition of hard-to-decarbonise sectors and the fact that usesthat can be directly electrified (such as building heating) it is not appropriate to use hydrogen (since the latter requires electricity equal to one and a half times its calorific content), there is a need not to spend public funds on the use of hydrogen in sectors that can easily be electrified.
In this context, there will be no public sponsorship for theprimary purpose of injecting the hydrogen produced into the gas transmissionor distribution networks or the combustion of hydrogen for heating buildings. Public funding will be considered for subsidising only green hydrogen production plants with aview to using hydrogen or its derivatives in uses that cannot be otherwise decarbonised (e.g. industry, transport), with a tolerance for injection into natural gas networks of only small quantities that are “surplus”, in the first phase of development of hydrogen production projects. The objectives set out in the EUagenda in relation to the decarbonisation of industry and transportcan form the basis for the development of the production of renewable hydrogen and its derivatives in Greece. The first objective is that grey hydrogenused in Greek industry is replaced by renewable hydrogen. It is understandable that in the case of a grant from national resources, the hydrogen produced or its by-products should be consumed within Greece.

Of course, support will be given (licensing and institutional) to the implementation of hydrogen production projects which will be subject to Community financial instruments (such as the EuropeanTrack of Pedestrian Hydrogen) and are in line with the terms of these programmes, as well as those projects that do not apply for State aid, regardless of the destination of thehydro.

2. **Priorities for hydrogen in road transport**

Another point is the strategy for the use of hydrogen in road transport. With the data so far, electric mobility with small and medium-sized vehicles appears to be growing globally without problems, while heavy vehicles are also underdevelopment. The network of electric charging stations can be developed relatively easily and at low cost. On the contrary, experience shows thatdriving of small and medium-sized vehicles, despite technical advantages, appears to face serious cost problems hampering its unhindered dissemination (see California case). Thus, due to the multiple cost of hydrogen refuelling stations (at least 100 times that of charging stations) and the cost of hydrogen itself, the development of a network of hydrogen refuelling stations for land vehicles will be prioritised in the heavy road or urban transport sector, where hydrogen traffic seems to solvesome technical problems more altogether (although research is being developed also for the development of electric heavy-duty vehicles). The NECP has a conservative policy in this area due to the high risk of unused investments of a huge size of the frontloading of dense network ofhydrogen refuelling stations for small/medium vehicles. For the same reason (cost-effectiveness and safety), priority will be given to electrification of trains over hydrogen. The relevant regulatory text is Regulation (EU) 2023/1804on alternative fuels infrastructure (AFIR). Its optimal implementation will be considered in conjunction with the technology and development of hydrogen-powered heavy-duty vehicles and the available financial instruments.

3. **Development of hydrogen valleys (hydrogen valleys)**

Hydrogen valleys are exceptional cases as project candidates for the first-of-a-kind investment cost subsidy. A hydrogen valley is a smallor medium-scale ‘hydrogen economy’ or local ‘hydrogen economy’. The concept ofvalleys integrates all steps of the hydrogen value chain including supply infrastructure. It makes use of local assets, such as reusableenergy facilities, supply chain infrastructure, etc., including local clean energyneeds such as local industrial processingand transport catering. Integration is beneficial for learning the optimisation of the technical, economic and legal components of thelogistics chain and the matching with consumption. It is a strongtest framework for assessing the viability of business plans. It-stimulates the cooperation of many actors and participants that is useful for the establishmentof appropriate technical and trade protocols and collaborative investment.

VI. Other measures and policies

Other measures and policies considered are:

- State support for the development of hydrogen use infrastructure (such ashydrogen refuelling stations for heavy-duty vehicles)
- State support for the development of the productionof hydrogen equipment (electrolysis systems, fuel cells, hydrogen storage bottles, etc.)
- State support for the transformation of users' facilities and equipment to use hydrogen at the fossil fuel location (industry,transition)
- Fossil Hydrogen with Carbon Capture and Storage or Use (Low Carbon Hydrogen in line with the Hydrogen and Decarbonised Gas Market Directive)
- Reducing environmental and energy taxes and levies on the production and use of green hydrogen and its derivatives
- Setting up an institutional framework for the licensing and construction of hydrogen-stops

Implementation of an organisation for the certification of renewable fuels

3.3.4 measures and policies to promote renewableliquid fuels

The development of renewable liquid fuels will be based on the objectives recently adopted by the EU through the new RED Directive. According to it, it is planned that by 2030:

(a) a reduction of at least 14.5 % in greenhouse gas emissions in the transport sector as a whole compared to 2022 (the draft new NECP achieves this target for land transport), or alternatively a 29 % share of renewable energy (including green electricity) in the transport sector (the draft new NECP envisages 29 %)

and

(b) a percentage of total transport fuels of at least5.5 % cumulatively of advanced biofuels (i.e. derived from feedstockthat cannot be used or used for human or animal consumption) and non-biobasedsynthetic fuels (RNFBO, including hydrogen), the latter being atleast 1 %.

Specifically for aviation fuels, the new ReFuelEU Aviation Regulation provides for the-proportion of renewable aviation fuels (SAF) to be 2 % of the total by 2025, 6 % by 2030 and 70 % by 2050. The above renewable fuels includeadvanced biofuels, synthetic fuels of non-biological origin and aviation fuels made up of recycled carbon in accordance with the Directive's criteria for the sustainability and reduction of greenhouse gas emissions over the entireproduction, transport and consumption cycle. In particular, synthetic biofuels should be at least 1.2 % by 2030 and 35 % by 2050.

For maritime fuels, the FuelEU Maritime Regulation 2023/1805 provides for the possibility ofa mandatory 2 % share in renewable fuels of non-biologicalorigin (RNFBO) in relation to the annual energy used by ships since 2034, if the share of renewable fuels of non-biological origin in relation to the energy consumed by ships in 2031 is less than 1 %. The introduction of a multiplier of 2 is envisaged for the contribution of nano fuelsof non-biological origin to the calculation of the greenhouse gas emission reduction target of the coastal shipping sector.

In order to achieve the above objectives, the following measures and policies have been selected:

- Adopt legislation providing for corresponding obligations on fuelsuppliers or other actors involved (airlines, etc.). The existingbiofuel grafting for diesel and petrol will be gradually replaced bythe above quotas, but no conventional biofuels will be included.
- Organisation of a certification scheme for the production or import of renewable fuels
- Coverage of obligations through green certificates in accordance with the practicesto be developed in the EU
- Encouraging the reduction of the consumption of liquid or gaseous fuels in the-transition through measures such as:
    - the use of MSMs and teleworking
    - electrification and extension of track-based means
    - promoting the electrification of passenger and other roadtransport (where technically possible)
    - the electrification of vessels at berth and stationary aircraft (cold ironing).
- fiscal and/or other financial incentives, in order to contain theincrease in unit transport costs resulting from the increased production costs of renewable fuels, with a particular focus on the falls ofvulnerable citizens and businesses that are disproportionately affected.

Given that the production and penetration of renewable fuels in transport is now embryonic, the measures will evolve in line with good practices developed at EU level and the available financial means.

3.3.5 summary of policy measures for renewable liquid and gaseous fuels

N/A	Measure	Objectives	Affected the mega	Category of Measure
1	Development of an institutional framework for the production of biomethane and its injection intogas networks	Coal,energy-independent,-waste-treatmentand circular-coatings	Industry, electrotherapy, building,-metropolitan,-once, a —flour/animal husbander-food	Normal
2	Organisation of asystem for the feedingof biomethane and second generation biofuels in accordance withthe requirements of Communitylaw	Coal; energy-independent-processing; APC wasteand circular economy	Industry, electrotherapy, building,-metropolitan,-once, a —flour/animal husbander-food	Statutory/-Institutional
3	Development of afiring regime and implementationof biogas/biomethanescrapie projects	Coal; energy-independent-processing; APC extraction of-powders	Industry, electrotherapy, building,-metropolitan,-once, a —	Normal, TE chnic

		and circular economy	flour/animal husbander-food	
4	Formulation of technical-requirements for fuel writtenoff with biofuels on the basis of international regulations	Coal; energy-independent-processing; APC wasteand circular economy	Transport, farm/livestock – food, fuel industry	Normal
5	Obligation quotas biofuels in bunker fuels-(transposition ofcommon legislation)	Coal; energy-independent-processing; APC wasteand circular economy	Transport, farm/livestock – food, fuel industry	Normal
6	Setting up a marketfor guarantees or provenance (-'certificate leeks')	Carbonisation, energy-independent	Industry, electro-conductor, with each-other	Normal
7	Creating incentives to collect/disincentivise the disposal of deep-generation biofuelfeedstock from farmers;	Carbonisation, energy independent—	Industry, electro-care, building	Statutory/-Institutional

	livestock,agro-industrial, municipal waste	Sia, APC wasteand circular economy	meas, at-times, a — flour/animal husbander-food	
8	Motivating the release of the semi-solidbedroom of drop-downunits biogas/biometa — N	Coal; energy-independent-processing; APC wasteand circular economy	Industry, electrotherapy, building,-metropolitan,-once, a — flour/animal husbander-food	Statutory/-Institutional

Table 26 Policy measures for biomethane and liquid biofuels

N/A	Measure	Objectives	Affected sector	Type ofmeasure
1	**Development of an institutional framework for the siting and licensing ofthe production of hydrogen and synthetic fuels, includingthe adoption of standstillregulations**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory**
2	**Organisation of asystem certifying renewable hydrogen and synthetic fuels**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory/Administrative**
3	**Securing funding anddeveloping pilot stations forH2 for heavy-duty vehicles according to the AFIR**	**De-carbonisation,-earth ANE descendant**	**Transport**	**Administrative/ Technical**
4	**Develop a support scheme and implement green hydrogen pilot projects**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory, technical**
5	**Formulate and ensure coloursupport for thechewing of green hydrogen productionand staining pluspositive fuels in the context oflynic planning at-southern and national level**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory/Administrative**
6	**Setting up a support scheme for scaling up the production ofleeks hydrogen and synthetic of fuel**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory**
7	**Obligation of renewableenergy quotas in fuel-fuelledfuels and in industry (-after Community legislation)**	**De-carbonisation,-earth ANE descendant**	**Industry, transport**	**Regulatory**
8	**Developing a support scheme for the use of green hydrogen in industry**	**De-carbonisation,-earth ANE descendant**	**Industry**	**Regulatory**

9	**Development of a support scheme for the production of green hydrogen equipment and synthetic exhaustas part ofa more general legislation to support the production ofproduction equipment**	**Carbohydrate,-encapsulation ANE descendant**	**Industry, transport**	**Regulatory**
10	**Development of taxationof all renewable gases andliquid fuels as part of ageneral review of the energy taxation system**	**Carbohydrate,-encapsulation ANE descendant**	**Industry, transport**	**Regulatory**
11	**Formulation of import/transport/export legislation leek of hydrogen in compliance with Community legislation**	**Carbohydrate,-encapsulation ANE descendant**	**Industry, transport**	**Regulatory**

Table 27 Policy measures for hydrogen and synthetic fuels of non-biological origin

3.4 energy efficiency improvement

The 2030 energy efficiency improvement target results in significant energy savings given the expected economic growth and the increasein national income. Economic growth is accompanied by an increase in industrial production and consequently an increase in energy consumption, which is limited by energy efficiencymeasures in industry. Moreover, growth and income growth leads to an increase in themobility of passengers and goods and thus an increase in energy consumption, despite the measures of electro-mobility, which significantly reduces the energy consumption of a vehicle, and the imposition of stricter standards for newvehicles. These measures take time to deliver on all energy consumption in the transport sector as they are imposed on new vehicles. To achieve this objective of improving energy from efficiency, a coherent set of policy measures isenvisaged, which are presented below for specific policy priorities.

The definition of policy measures to improve energy efficiency materialised with theaim of covering ten different policy priorities (FP3.1-FP3.10), which are illustrated in Figure 13.

FP4.1: Improving the energy efficiency of public buildings and exemplary public role sector

FP4.2: Strategy for renovating the building stock in the residential and tertiary sectors

FP4.3: Promotion of energy performance contracting by ESCOs

FP4.4: Promoting market mechanisms

FP4.5: Promoting innovative financial tools to leverage private capital and financial sector involvement

FP4.6: Improving energy efficiency and industrial competitiveness

FP4.7: Promotion of interventions for the modernisation of water supply/sanitation infrastructure and irrigation

FP4.8: Promote efficient heating and cooling

FP4.9: Educating/informing professionals and consumers about energy efficiency equipment and rational use of energy

FP4.10: Tackling energy poverty

Figure 13: Policy priorities to promote energy efficiency.

3.4.1 Energy efficiency in the building sector – Long-term renovation strategy for the national building stock

The long-term renovation strategy of the building stock will be revised taking into account the increased renovation target of the building stock set. The objective of this strategy is to carry out technology-economic analysis and to highlight the best measures to fulfil the high rateof renovation and decarbonisation of the building stock. A crucial aspect is the design and implementation of targeted policy measures to mobilise investment to meet the strategy's objectives capitalising on existing measures and programmes. In any case, the operating framework of the existing programmes will be improved with a view to several objectives, asindicative of increasing potential beneficiaries, promotingcost-effective and result-efficient interventions, more active involvement of domestic financial institutions in financing the requiredremembrance and promoting leadership in the domestic construction andtransition industry.

Successful funding programmes to improve the energy efficiency of residential buildings will continue seamlessly, and I will amend appropriatelyto target more effectively supporting financially vulnerable andinactive vulnerable households. The focus will be on adapting and improving the existing financing model with a view to increasing the existingleverage paths by the beneficiaries. At the same time, the framework of existing tax exemptions granted to households will be explored and improved with a view to speeding up the required energy renovation interventions with alternative financing modes.

The design and implementation of financing programmes to improve energy efficiency in enterprises will be intensified in conjunction withthe tax and town planning incentives already in place to promote energyand water saving measures in companies. In addition, it will facilitate companies'access to the required financing through the provision of bothfavourable loans and guarantees, while alternativefinancing losses, such as energy efficiency contracts, will also be promoted. The role of energy audits and the development of a systemof energy management in tertiary sector buildings through appropriate measures to promote them is-expected to be a key factor.

In the case of public buildings, the exemplary role of the citywill be strengthened by improving the existing 'Ilektra' programme for the energyupgrading of public and municipal buildings, as well as the continuous monitoring of theenergy consumption of public buildings with a view to reducing energy consumption annually in all public bodies. In any case, the promotion of technically feasible and socially cost-optimal measures and programmes will be a key priority for public buildings. In addition, the financing of the energy upgrading of public buildings will takeplace on the basis of the Energy Performance of Buildings Action Plans ofthe Municipalities and the Municipal Emission Reduction Plans. To this end, the digitisation of the above projects will be prosecuted with a view to makingtheir implementation more efficient. An important contribution should be made by upgrading the role of energy managers in public buildings, as it is already added as a condition to financing programmes for the energy upgrading of publicbuildings. The electronic platform for monitoring the energy behaviour of-especially single buildings is intended to assist the work of energy operators. Contractingthe relevant regulatory framework with a view to upgrading their role will be launched by facilitating the achievement of energy saving targets and the rational use of energy.

At the same time, alternative financing mechanisms will be adopted, for example, in the case of publicutilities. To this end, a central energy programme is plannedfor public buildings through energy performance contracting, which will be basedon the prioritisation and aggregation of public buildings with a view to launching existing sub-programmes based on the buildings to be included in each group. Specificfinancial tools will be put in place to support energy service companies that will undertake the energy upgrading of buildings as part of the planned measure, such as the provision of low-interest loans and land pathsin line with the provisions of the State aid framework.

Green public procurement is expected to play an important role inthe new period, with criteria for promoting energy-efficient technologies and servicesin buildings and equipment used, while highlighting the exemplary role of the public sector.

The use of RES systems for heating and cooling (mainly heat pumps and solar thermal systems) will be enhanced through the combined use of different policymeasures in full compliance with the projections of the comprehensive assessment to promote efficient heating and cooling, which will be appropriately revised in the light of the new energy savings and RES targets. Targeted programmes to promote specific RES systems for heating and cooling will beplanned and existing programmes will be strengthened. The planned funding programmes will contribute to promoting economically optimal RES systems per final consumer category, while also taking into account their contribution to the respective target.

The focus will be on increasing nearly zero-energy buildings in linewith the requirements of the Energy Performance of Buildings Directive. To this end, new regulatory, fiscal and financial measures to create the right framework and create incentives for new and deeply renovated buildings will help to maximise the number of buildings that go beyond minimum energy performance requirements.

In addition, corresponding measures will be provided for renewing the building stock that has completed its lifecycle, while using the waste from construction and demolition excavations in accordance with the principles of the circular economy.

Additional information actions on energy efficiency will help to raise awareness and ultimately encourage final customers to adopt morerational energy use practices in buildings. To this end, the role of Energy Performance Certificates by exploring alternative ways of transforming them into tailor-maderoadmaps for the energy upgrading of buildings or building units, and thedevelopment of new schemes for the recognition of qualifications, accreditation and certification of installations should contribute to this end, so as to ensure that the measures for saving energy are properly implementedand that the maximum potential of the technologies is exploited.

3.4.2 Energy efficiency in the industrial sector

Priority will be given to the promotion of targeted job-savingprogrammes in enterprises and industry with a focus on production processes in line with the provisions of this plan. More specifically, the implementation of the energy saving measures proposed by energyaudits is directly driven by**programmes to improve energy efficiency in** SMEs in the tertiary sector, together with the already **establishedtax incentives.**

The aim is to continue financial incentives for SMEs as well as to introduce additional incentives for the implementation of energy saving measures proposed by energy audits also for obligated large enterprises in the industrial sector. In addition, new measures will be designed to support the implementation of energy management systems in non-obligated SMEs with a view to continuously improving their energy efficiency. It should be noted that these policies are expected to significantly strengthen the competitiveness of businesses, while at the same time shielding from future energy crises.

For the industrial sector in particular, specialised programmes will be designedto conclude programmatic agreements with industries and manufacturing companies with a view to providing financial incentives to improve energy efficiency, subject to the achievement of specific targets for both energy savings and GHG emission reductions. In addition, a package of measures will be designedto provide the cost incentives to promote efficient heating and-cooling systems including RES technologies including the use of waste heat in full compliance with the projections of the comprehensive assessment to promote efficient heating and cooling.

Additional specific financing mechanisms will be designed to enhancethe materialisation of energy efficiency improvement measures in the industrial sector throughEnergy Efficiency Contracts, such as subsidising the costof lending and facilitating access to finance for Energy Services Undertakings.

It is worth mentioning the obligation to reduce emissions by at least 30 % by 2030 compared to 2019 for projects and activities in the public and privatesector whose construction or operation may have an impact on the environmentand do not fall within the scope of the EuropeanEmissions Trading System (ETS), in accordance with the provisions of Article 19 of the Climate Law (Law 4936/2022 (Government Gazette, Series I, No 105/27-05-2022)).

Finally, the existing framework for mandatory energy audits in companies with high energy consumption will be significantly strengthened in view of the new provisions of the revised Energy Efficiency Directive (EU) 2023/1791 (Article 11). More specifically, the existing electronic energy audit archive will be upgraded to form a **single system for reporting and** monitoring the energy consumption of obligated undertakings in the tertiary sector, industry and transport in accordance with the revised Energy A Energy EfficiencyDirective. This system will integrate existing systems (ETMEAR Reduced DebtInformation System and Tax Exemption Framework for Enterprises) and allow for the introduction and systematic monitoring, in a simpler and more comprehensive manner, of new reporting obligations, energy audits, agreements and action plans depending on the sector and level of energy consumption, encouraging harmonisation and simplification of procedures. In the context of the development of this system, provision will be made for the creation of an **open database of energy efficiency measures (best practices)** in the industrial and tertiary sectors in order to increase the efficiency of energy audits, especially in the industrial sector.

In addition, with the shape: 'Compensation for the average emission costs in 2021-2030 (Carbon Leakage)', aid shall be granted to enterprises exposed to a significant risk of carbon-leakage due to the cost ofallowances of the EU greenhouse gas emissions trading scheme passed on in electricity prices, in order to offset these costs in accordance with State aid rules.

The purpose of this aid is to avoid a significant risk of carbon leakage, in particular due to the cost of European Union emission allowances (EUA) passed on in the electricity prices borne by the beneficiary, if its competitors from third countries do not face similar costs intheir electricity prices and the beneficiary is unable to passon this in the prices of the products without losing a significant market share. The beneficiaries of the aid are enterprises in specific sectors of economic activity for their establishments (2020/C 317/04/25.09.2020).

3.4.3 Market mechanisms

The promotion of energy efficiency improvement interventions will befacilitated by the activation of market mechanisms. In this direction, the scheme of the Energy Efficiency Obligation Scheme will retain a key role, together with alternative policy measures in achieving the energy savings target. The allocation of the target among obligated parties will take into account the achievable techno-economic potential of energy savings in the obligated parties' sectors of activity and the mix of alternative policy measures to be designed.

At the same time, the possibility of supporting obligated parties will be explored by developingthe institutional framework for the repayment ofsavings investments through energy bills (on-bill financing) and the exploitationof contributions with alternative policy measures.

Accordingly, consideration will be given to further expanding the existing scheme through the operation of a mechanism similar to white certificates, with virtual energyequivalents (EEIs) (energy token). The use of specialised innovative digital modelling as an incentive for the whole lifecycle of a building, starting from the Design/Construction phase, to operating and adapting to the ever-changing needs of businesses and organisations that use it, can contribute in particular to the achievement/implementation of theobjective.

Competitive processes to achieve energy savings are a fairly promising market mechanism aimed at promoting energy efficiency improvement actions in certain sectors in an orderly and efficientmanner, the tertiary and industrial sectors. Competitive processes will ensurethe implementation of energy efficiency improvement interventions in the firstway in terms of cost and outcome, as well as reducing the risk of third party interventions by grouping small projects.

3.4.4 Addressing energy poverty

The following policy measures will be implemented to achieve the objective of tackling energy poverty for each of the dimensions of the respective Action Plan**:**

Dimension I: Consumer protection

- M1: Social tariff scheme Mitigating the impact of the crisis in the field of energy
- M2: Making available an 'energy card' to affected households
- M3: Regulatory package to protect affected households

Dimension II: Development perspective: Actions to improve energy efficiency and increase the use of RES

- M4: Energy upgrading of residential buildings of affected households; and promoting the installation of RES plants to meet their energy needs
- M5: Incentivising existing mechanisms for actions in affected persons households – Just Transition Areas
- M6: Incentivising existing mechanisms for actions in affected persons households – Energy Efficiency Obligation Scheme
- M7: Building on the Renewable Energy Communities and Communities Citizens to tackle energy poverty

Dimension III: Information and education actions

- M8: Information and education of affected households in the context of Ka energy Efficiency Obligation Views
- M9: Carrying out targeted information and education actions

Additional policy measures will be launched, such as, but not limited to, the development of affectedhouseholds and the promotion of one-stop-shop services, and the more active involvement of all parties involved, in particular local and regional authorities, will be pursued both in the implementation of the measures and in the identification of affected households.

3.4.5 Horizontal/Other Actions

The achievement of the above objectives related to the improvement of energy efficiency isensured by the application of the Energy Efficiency First principle, prioritising the choice of the most efficient measuresand at the same time leading to multiple benefits in all final consumption sectors, such as reducing energy costs, improving conditionsin buildings, increasing workers’ productivity, increasing domestic value added and employment, and improving the competitiveness ofbusinesses.

In addition, the implementation of the programme to replace old and energy-intensive electrical appliances with new more energy efficient appliances will be strengthened by providing a subsidy for the residential sector. These programmes aim to address thesituation of specific categories of energy-intensive household appliances, with new, technologically advanced, environmentally friendly and more energy efficient appliances, while ensuring the recycling of old electrical appliances that are notbecoming.

It should be noted that the political priority is to support final consumers in purchasing durable advanced technology and low carboncap goods in order to ensure a reduction in energy consumption.

Particular emphasis should be placed on the installationof advanced lighting systems in the tertiary sector and on lighting, contributing to the objectives of improving energy efficiency. The special programme of Depositsand Loans to upgrade municipal street lighting will continue with a view to reducing energy consumption, and new galleries will be designed for-the energy upgrading of street lighting through Energy Efficiency Contracts. To this end, action will be taken to modernise the water supply/sewerage and irrigation infrastructure, with a view to saving water andenergy at the same time.

A specific set of policy measures aimed at improving energy efficiency in the agricultural sector is under consideration. Examples include both the sub-design ofa measure to improve the energy efficiency of pumping stations and new measuressuch as the energy upgrading of agricultural machinery and the reduction of energy consumption in greenhouses and livestock units.

Finally, as part of a holistic approach, the design and implementation of policy measures in the areas of buildings, transport and networks is guided by the promotion of climate-neutral cities. In this context, both buildings and vehicles, as independent entities, will be able to communicate and interact through supportive structures based on the use of advancedICT technology. Smart meters and smart grids will be a key part of these plans, allowing for the monitoring and management of the large amounts of information needed for their harmonious operation. The completion of the pre-scriptdeployment of smart meters will make a significant contribution to the rational use of energy by final consumers. In addition, in conjunction with the new regulatory framework of the demand response mechanism, better electricityload balancing and peak load management is expected to be achieved.

3.4.6 Summary of measures

Table 28 summarises all policy measures for the energy efficiency dimension:

Numbering	Policy measure name	Correlation with-politicalpriorities	Target byroad 2012/27/EU	Affectedparty	Category of Measure
M1	**Public sector renovationfunding programmes**	**FP3.1; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary sector – Public buildings	Financial measure
M2	**Central programme for energy upgrading of public buildings through energy performance contracting**	**FP3.1; FP3.3; FP3.5, FP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary sector – Public buildings	Financial measure
M3	**Financing of upgrades of publicbuildings on the basis of the Energy Performanceof Buildings Action Plans of Municipalities and Regions and Municipal Emission Reduction Plans**	**FP3.1; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary sector – Public buildings	Financial measure
M4	**Improving the regulatory framework and strengthening the role of public energymanagers**	**FP3.1, FP3.8**	Objective Article 3 Objective Article 7	Tertiary sector – Public buildings	Regulatory measure
M5	**Promoting energy management systems in public buildings**	**FP3.1, FP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary sector – Public buildings	Regulatory,legal measure
M6	**Financing programmes for refurbishment of-residential buildings**	**FP3.2; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Household sector	Financial measure
M7	**Funding programmes for therenovation of tertiary sector (non-public)**	**FP3.2; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary sector –-Outside buildings	Financial measure
M8	**Use of fiscal and town planning incentives to implement energy-savinginterventions in residential and tertiary buildings (outside the public sector)**	**FP3.2, FP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Residential sector Tertiary sector –-Outside buildings	Regulatory,legal measure

Numbering	Policy measure name	Correlation with-politicalpriorities	Target byroad 2012/27/EU	Affectedparty	Category of Measure
M9	**Promotion of RES systems to meet thermal and cooling needs in the building sector**	**FP3.2, FP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Residential sector Tertiary	Regulatory,legal measure
M10	**Replacement of old and energy-intensiveappliances with new energy efficientappliances**	**FP3.2, FP3.5**	Objective Article 3 Objective Article 7	Household sector	Financial measure
M11	**Regulatory measures to promotenearly zero-energy drinks**	**FP3.1; FP3.2; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Total buildings	Regulatory measure
M12	**Regulatory, fiscal and financialsnails to promote buildings above theminimum energy requirements**	**FP3.1; FP3.2; FP3.5, FP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Total buildings	Regulatory,legal measure
M13	**Promotion of EPCs through targetedfunding programmes for the energy renovationof the building stock**	**FP3.1; FP3.2; FP3.3; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Tertiary	Financial measure
M14	**Strengthening the role and improvingthe regulatory framework ofenergy efficiency sub-schemes**	**PP3.4**	Objective Article 3 Objective Article 7 Objective Article 4	Total consumption-duty sectors	Regulatory measure
M15	**Implementation of competitiveenergy savings processes**	**PP3.4**	Objective Article 3 Objective Article 7 Objective Article 4	Total consumption-duty sectors	Financial measure
M16	**Development of an institutional frameworkto free energy savings investments through energy bills (on-bill financing)**	**FP3.3; FP3.5; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Industrial, tertiary and household sectors	Regulatory measure
M17	**Promotion of energy audits on non-debtors, businesses**	**FP3.2; FP3.5; FP3.6, FP3.8**	Objective Article 3 Objective Article 7	Industrial and tertiary	Financial measure

Numbering	Policy measure name	Correlation with-politicalpriorities	Target byroad 2012/27/EU	Affectedparty	Category of Measure
M18	**Funding programmes through energy audits**	**FP3.2; FP3.5; FP3.6, FP3.8**	Objective Article 3 Objective Article 7	Industrial and tertiary	Financial measure
M19	**Promotion of energy management systems in non-obligated SMEs**	**FP3.2; FP3.5; FP3.6, FP3.8**	Objective Article 3 Objective Article 7	Industrial and tertiary	Financial measure
M20	**Framework for the recognition of qualifications, accreditation and certification of energy efficiency improvement intervention installers**	**PP3.9**	Objective Article 3	Total consumption-duty sectors	Regulatory measure
M21	**Strengthening the role of EPCs by amending and upgrading them**	**PP3.9**	Objective Article 3	Tertiary andquinsic sectors	Regulatory measure
M22	**Implementation of information and awareness-raising actions to improve energyefficiency**	**PP3.9**	Objective Article 3	Total consumption-duty sectors	Measure noon — sensitising and sensitising
M23	**Promoting green public procurement**	**FP3.1, FP3.8**	Objective Article 3	Public sector	Regulatory,legal measure
M24	**Financing programmes forenergy by road network**	**FP3.1; FP3.3; PP3.5**	Objective Article 3 Objective Article 7	Public sector	Financial measure
M25	**Promoting climate-neutral cities using ICT technologies**	**FP3.1; FP3.2; PP3.8**	Objective Article 3 Objective Article 7 Objective Article 4	Total consumption-duty sectors	Technical, financial measure
M26	**Programmes for the conclusionof programmatic agreements with industries andmanufacturing**	**FP3.6, FP3.8**	Objective Article 3 Objective Article 7	Industrial the mega	Financial measure
M27	**Funding programmes to improve thelong-term efficiency of industries andmanufacturing enterprises including the promotion of IGSs**	**FP3.3; FP3.5; FP3.6, FP3.8**	Objective Article 3 Objective Article 7	Industrial the mega	Financial measure

Numbering	Policy measure name	Correlation with-politicalpriorities	Target byroad 2012/27/EU	Affectedparty	Category of Measure
M28	**Provide financial and fiscal incentives for the promotion of RES technologies and thevalue of waste heat in biomechanical plants**	**FP3.6, FP3.8**	Objective Article 3	Industrial the mega	Financial measure
M29	**Promotion of measures to modernise water-supply/sewerage and irrigation facilities, with a view to saving water and energy at the same time**	**PP3.7**	Objective Article 3 Objective Article 7	Water infrastructure	Technical facilities, Eco direct measure
M30	**Review and implementation of policy measures under the Action Plan totackle energy poverty**	**FP3.2; FP3.4; FP3.8; FP3.9; PP3.10**	Objective Article 3 Objective Article 7 Objective Article 4	Household sector	Regulatory,Legal and Measure noon — sensitising and sensitising

Table 28 Summary of policy measures for the energy efficiency dimension

3.5 measures and policies on energy security

The definition of security of supply policy measures for the period 2023-2030 aims to cover five different Policy Priorities (FP5.1-FP5.4), which are presented in the figure below.

FP5.1: Enhancing diversification of energy sources and routes

FP5.2: Reducing energy dependence and making the country a regional energy hub

FP5.3: Promote systems providing flexibility, and storage and demand response systems; ensure the country's output adequacy

FP5.4: Readiness of the country and the bodies involved in responding to the restriction or interruption of the supply of energy supply

FP5.5: Increasing resilience of critical energy infrastructure

Figure 14 Security of Supply Policy Priorities 2023-2030.

The country's main priority is to increase the diversification of sources andimport routes, thereby enhancing the security of energysupplies. At the same time, reducing energy dependency whiledeveloping energy sources, compatible with the 2050 climate goals, is obviouslythe first and firm priority, especially in the context of long-term energy planning. However, as long as this energy dependency remains high and in order to avoid events such as the energy crisis experienced by the country in 2008-2009 and more strongly, at the end of 2016 to early 2017, as well as in 2022, it is necessary to diversify energy sources and suppliers-coming from third countries, so that there is no dependence on a single fuel or geographical area or on a single pipeline, alongside the one. promotion the penetration of RES and the most important is to promote energy efficiency improvement measures, which are the first priority as mentioned above in all dimensions of the country's energy planning.

However, in addition to measures to strengthen the country's position in the region, measures must be taken to ensure that the country and the actors involved are ready to deal with the reduction and/or disruption of energy resources and, in this context, provide for specific initiatives and the implementation of regulatory mechanisms.

The policy measures, which have been specified under the above policy priorities, are analysed separately in the following sections.

3.5.1 Measures and policies to enhance the diversification of energy sources and routes

Increasing diversification of energy sources and suppliersfrom third countries: In the context of securing its energy supply and preventing energy shortages that will cause significant economic damageto many sectors of its economy, eachcountry has as itspolitical priority to increase the diversification of energy sources and to increase the number of third countries supplying the country with oil, gas and electricity.

Important policy measures in response to the above priority are the promotion of gas transmission projects that will enable fuelto emerge from more countries, including further strengthening thecountry’s electricity and gas interconnections with the country’s tone marketsthat will help the flow of energy seamlessly at regional level.

Development of indigenous hydrocarbon deposits: Greece continues to be a growing market in gas exploration and production in the Eastern Mediterranean. Both the Hydrocarbon Research and Exploitation Programmein El Alada, the TAP Trans-Adriatic Pipeline, theGreece-Bulgaria Interconnector (IGB) and the East-Med pipeline are important projects enhancing the diversification of the EU’s energy supply and ensuring security of supply to reduce energy dependency on third countries.

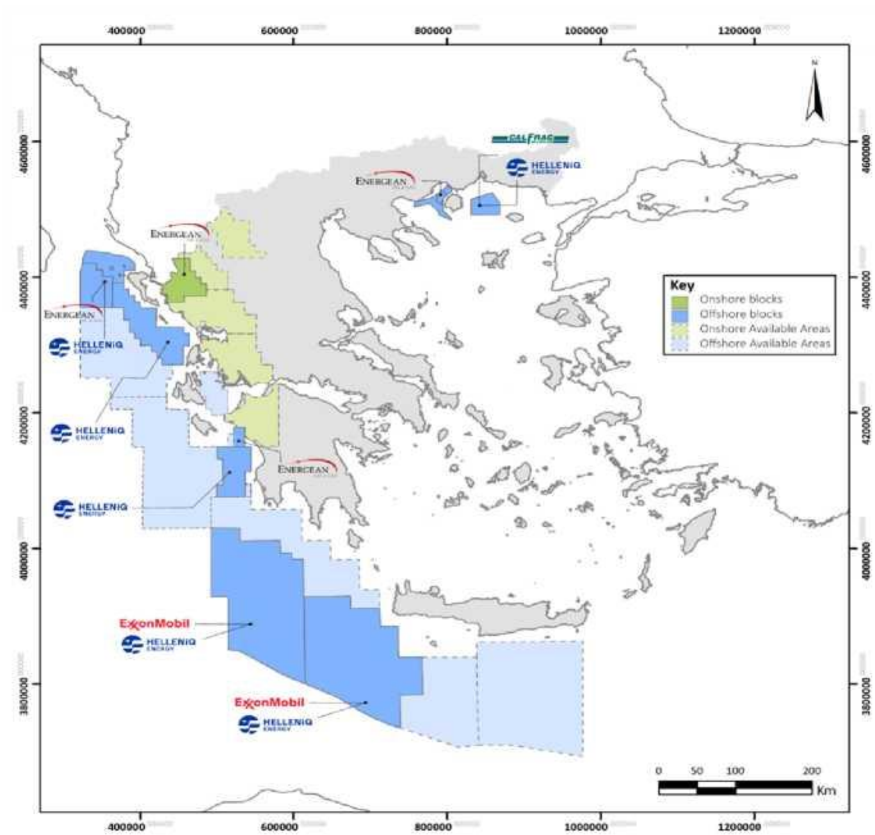


Figure 5 Hydrocarbon exploration sites

The Hellenic Republic has now transferred to consortia of companies 9 sea and land areas, including that of Prison where the production of arableland has continued (at a declining pace) for four decades. This is the first time that the country has a large number of concessions with large international and Greek companies. In the light of the energy crisis in prices and security of supply, and taking into account the timepressure to exploit potential domesticgas deposits for the required energy transition, hydrocarbon exploration and exploitation projects were declared a national priority by the Prime Minister himself in April 2022. Over the last two years, research has been carried out with the completion of all geo-physical research programmes for active contracts and the decision to drill the land plot of Ioannis. In the next two years, the tenants are expected to decide to carry outground-based exploration drilling on most plots of land, with the aim – in the event of a deliberatedecision and successful outcome of the investigations – to have a domestic production ofcarbon water (beyond that of Prison) within the current decade.

The State pays particular attention to safety issues related to the exploration and exploitation of hydrocarbons and thus the protection of theenvironment. Environmental risks are examined by the competent departments of the Ministry of Environment and Energy, which lays down the terms and conditions, and approves the implementation stages. The EDEYEP, as the competent authority, monitors, inter alia, theimplementation of these contractual obligations by the trustees and their partners and intervenes if there are any deviations from either side. For the followingreasons, the Ministry of the Environment and Energy is preparing the National Planfor Response to Offshore Hydrocarbon Installations, with the coordination of all the jointly competent public bodies.

The direct economic benefits from the possible production of natural gas for the Greek State on the basis of a period of twenty-five years from the start of production will come from income tax and from production dividends and other compensations. At the same time, the promotion of a system of reallocation of hydrocarbon resources to support local economies affectedby the de-lignification of power generation, but also at national level through the possible allocation of resources for the energy transition, should mitigate the direct and indirect effects at local level by making the operation of this feedback loop a priority of public interest.

- A conservative estimate of the potential and potential stocks of these areas, but where no exploratory drilling has yet been carried out, varies according to preliminary data from the EDEAEPat 24 trillion cubic feet or 680 bcm. The possible confirmation of these deposits outweighs both present and future domestic demand for natural gas,making our country export by the end of the decade.

3.5.2 Measures and polarising the country as anenergy hub

Development of electricity interconnections: Making the country a regional energy hub is inextricably linked to the strengthening ofdomestic electricity generation and electricity storage systems and the development of energy interconnections with neighbouring countries.

In the case of electricity, new interconnections will be developed and existing ones strengthened. The main projects of national andinternational interest are:

1. Second interconnection between Greece and Italy

According to the results of the studies to investigate the need to strengthen the European Transmission Network, in the long term price convergence between the two countries requires a strengthening of the electricity interconnection between them62.

In the context of the Skopy Study jointly prepared by the Operators ofElectricity Transmission Systems (TSO's) in Greece and Italy (ADMIE), different alternative technical solutions were explored in detail for the development of a new undersea interconnection between Greece and Iia toachieve an increase in capacity between the two systems of between 500 and 1 000 MW.

In 2022, the joint working group of the competent operators concluded the Skopiency Study for the implementation of a second interconnection between Greece andIia, which included market studies, network studies and cost-benefit analysis. The data used in the studies, which focus on the years 2030 and 2040, are derived from the available data from ENTSO-E TYNDP 2020, with an appropriate update63 of critical parameters such as the estimates of the two-regenerative operators with the evolution of electricity generation and demand systems and the timing of the development of their transmission systems. For the Greek system, the assumptions made in the studies are in line with those of the new Capacity Adequacy Study. On the basis of the results, it was decided as the most exemplary and best techno-economical solution for the implementation of the secondarrangement between Greece and Italy, and the implementation of a new two-polar continuous current connector with a nominal capacity of 1 000 MW with voltage converter technology and return by sea (Bipolar VSC HVDC with sea-return) or alternatively via ametal return AGO.

The project has been incorporated into the last submitted Ten-Year Development Plan (DDP) of the System Manager (2024-2033) and the Ten-Year Plan of ENTSO-E (TYNDP), while the time horizon for completion is 2031.

2. Second interconnection between Greece and Albania

62 "CSE RgIP – Continental South – East Europe Regional Investment Plan) 2020", ENTSO-E, October 2020.

63 https://eepublicdownloads.azureedge.net/tyndp-documents/IoSN2020/200810_RegIP2020_CSE_before-consultation.pdf

Figure 6 Interconnection between Greece and Albania

In April 2020, ADMIE started cooperation with the Albanian System Operator (OST) regarding the possibility of implementing a new Greece – Albania Interconnection Line.

In this context, preliminary market, network and preliminary cost-benefit assessment were carried out, on the basis of which it was decided to implement a new interconnector.

400 kV between Greece and Albania, with a view to completion by 2030. The new 400 kV single interconnective aerial unit between a new hotspot in Western Greece (Thesprotia hotspot) with a connection to the Arachthos hotspot and the Fier station in Albania will have a nominal transport capacity of 2000 MVA and is estimated to have a total length of around 170 km, of which 45 km are located on Greek territory and 125 km on the territory of Albania.

The new interconnector is projected to increase capacity between the two countries by at least 200 MW in both directions. The project will facilitate the penetration of more RES in the two Systems, enhance convergence of markets and help achieve the objectives of the transition to a climate-neutral Europe.

3. Interconnection Greece – Cyprus – Israel

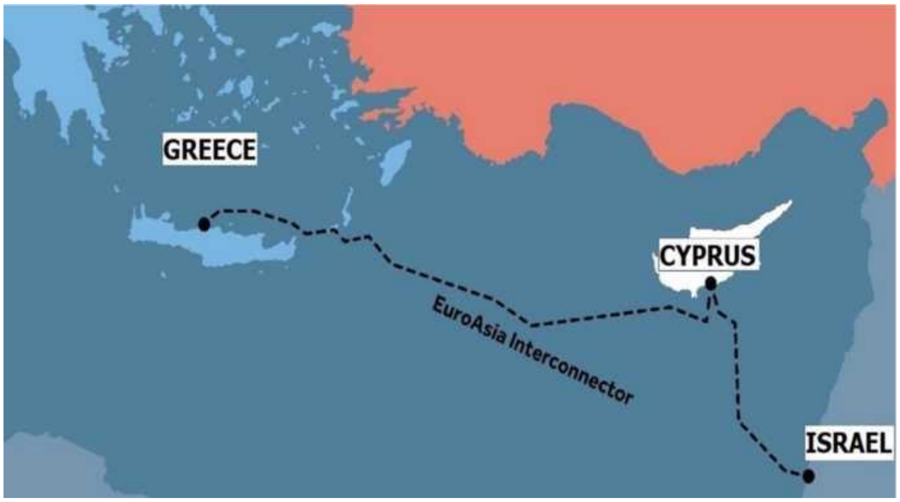


Figure 7 Greece – Cyprus – Israel interconnection

The project concerns the implementation of interconnection of the transmission systems of Greece, sheep and Israel with direct current connectors and includes sections 3.10.1 of the Israel – Cyprus interconnection and 3.10.2 of the Cyprus – Greece interconnection (Crete). The project is estimated at a total length of 1 208 km, a capacity of 1 000 MW and an estimated budget ofEUR 2,4 billion.

In October 2023, the System Operator was appointed as the Implementing Body and Project Promoter of the Electrical Interconnection Project between Greece, Cyprus and IISRAIL, ensuring the technical and financial capacity of the project and laying the basis for its timely completion.

To date, the section of the project Interconnection between Greece (Crete) and Cyprus, with a total length of 898 km, has matured with all the necessary studies, having received funding of 657 million. EUR 1 000 from the CEF (Connecting Europe Facility). All necessary permits for the start of construction works have been obtained and will be transferred to the System Manager under the agreement between them. In addition, a contract has been concluded for the cable part of the interconnector and a preferred contractorhas been identified for the construction of the Conversion Stations. At this stage, thestudies required for the contracting of the section relating to the conversion stations are being withdrawn. The aim is to complete this section in 2029.

4. Second interconnection between Greece and Türkiye

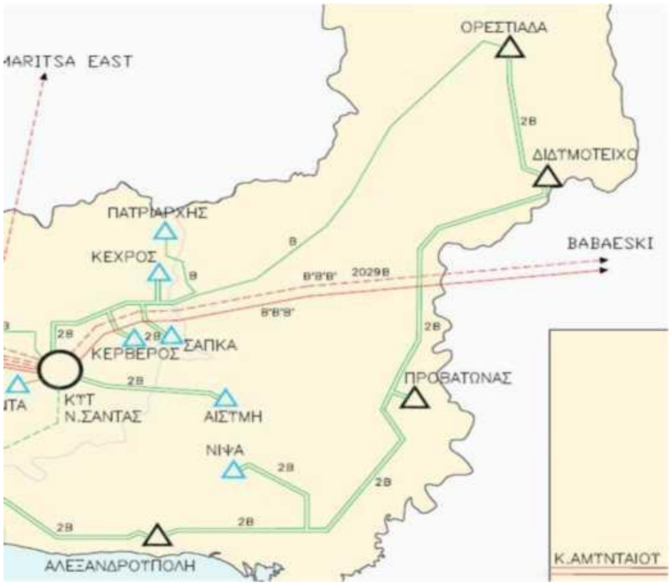


Figure 8 Second interconnection between Greece and Türkiye

A joint working group between the Transmission System Operators of Greece, Bulgaria and Türkiye (ADMIE, ESO-EAD, TEIAS) has previously been set up to explore alternative scenarios for the development of newinterconnections across the European and Turkish systems to increase transport capacity at the Greece-Türkiye and Bulgaria-Türkiye borders.

At a tripartite meeting held in Izmir, it was decided to submit a new project entitled "EAST BALKAN Corridor" to the ENTSO-E Pan-European Decade of Development Plan (TYNDP). The projects, a new interconnection of 400 kV Greece – Türkiye and a new interconnection of 400 kV Bulgaria – Türkiye were submitted as projects under consideration in the TYNDP 2020, while the resultsof the value of the TYNDP 2020 confirmed the need to increase capacity between these countries.

In March 2022, ADMIE and TEIAS agreed on the implementation of the new 400 kV interconnection between Greece and Türkiye, with a view to completion by 2029. The new 400 kV single interconnector airborne gas between the Nea Sandas hotspot and Babaeski in Türkiye will have a nominal transport capacity of 2000 MVA and it is estimated that it will have a total length of around 130 km, of which 70 km are on Greek territory and 60 km on the territory of Türkiye, as it is planned to go in parallel with the existing interconnection between the twohills.

The new interconnector is projected to increase capacity between the two countries by 600 MW in both directions. The project will strengthen the connection of the European Transmission System to the large extended system in Türkiye,which is relatively weak as the two systems are connected through three interconnectors (one Greece – Türkiye interconnector and two Bulgaria – Türkiye interconnectors, improve the stability between the interconnected systemsof South-East Europe and Türkiye, also allow for more RES to penetrate the Greek system, foster convergence of markets with thecountries of the tone, and help achieve the objectives for the transition to aclimate-neutral Europe.

5. Upgrading of interconnection between Greece and North Macedonia

In the context of ENTSO-E's Ten-Year Development Programmes (TYNDP) 2018 and 2020, the studies to investigate the needs of strengthening the European TransmissionNetwork, with a time horizon of 2040, identified the need to enhance the transmission capacity of electricity between the Greek system and the North Macedonia system for subsequentscenarios. The project proposed by ADMIE and MEPSOto address this need was to upgrade the 400 kV Meli-Bitola interconnection. This project was initially included in the TYNDP 2018 as a project under consideration, with a view to implementation after 2030. The project was also re-submitted to the TYNDP 2020 as a project under consideration, and the feasibility of implementing this interconnection will be examined in the next period.

6. Interconnection Greece – Egypt

Figure 9 Interconnection between Greece and Egypt

For the interconnection between Greece and Egypt, the project GREGY Interconnector has been proposed by Project Promoter for inclusion in the list of PMI projects and both ADMIE and RAAEY have indicated their support. A memorandum of cooperation between El ladaand Egypt was signed in October 2021 setting up a high-level working group, withrepresentatives of the two Ministries, Transmission System Operators and Regulators, to examine the technical and financial aspects of the electricity interconnection project between Greece and

Egypt in cooperation with Project Promoter, facilitate permitting and support its designation as a project of European interest.

A kick-off meeting between the managers of the two countries took place in May 2021 and a working group was set up to prepare the project. On thisside, ADMIE and EETC (Egyptian Electricity Transmission Company) signed a Memorandumof Understanding and a Cooperation Agreement.

7. Interconnection between Greece and Germany (Green Aegean Interconnector)

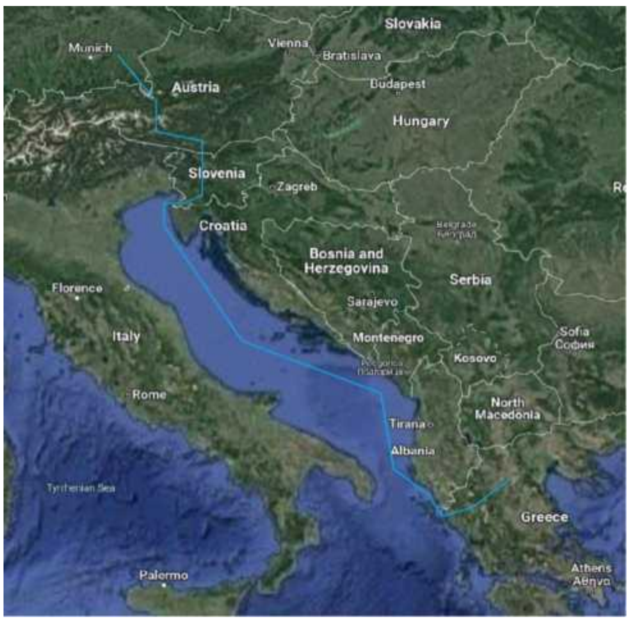


Figure 10 Greece – Germany interconnection (Green Aegean Interconnector)

The planning concerns a total transmission capacity of 3 GW of green energy and then further development of 6 – 9 GW. This will be concentrated by the Eastern Mediterranean and Egypt in Southern Europe. The route concerned undersea transit through Greece via the Adriatic Seafrom Slovenia, followed by a land route to Austria and SouthGermania. The project, with an initial budget estimate of EUR 8,1 billion, is planned to be submitted for inclusion in ENTSO-E's 10-year plan (TYDP 2024). The operators involved have expressed their willingness to work together to bring the project to maturity.

8. Interconnection between Greece and Saudi Arabia (Saudi Greek Interconnection)

The creation of the joint ownership special purpose company of the two Transmission System Operators (ADMIE and National Grid S.A – Saudi Electricity Company), in2023, is the first step towards the maturation of the electricity interconnection between Greece and Saudi Arabia.

The registered purpose of the SPV is to carry out studies on the commercial viability of the clean energy interconnector project from North Africa and the Middle East to Europe.

9. Development of gas interconnections

Accordingly, in the case of natural gas, the development of new interconnections andthe strengthening of existing interconnections with neighbouring systems, as well as the development of new import systems; and transmission of natural gas that they strengthen the country's role as a regional energy hub and will contribute to the region's dependence on Russian gas pipelines.

In particular, the main projects of national and international interest in natural gas concern:

1. the upgrade of the TAP pipeline up to 10 bcm/yr by 2027 and from the installation of an additional compressor in the Serres area,
2. increasing the capacity of the Greece-Bulgaria Interconnector (IGB) from 3 to 5 bcm/yr by 2025 (project under construction).
3. the implementation of the project of the LNG plant Alexandroupolis currently under construction and is expected to be operational in early 2024.
4. the implementation of the LNG DiorigaGas floating station in Korinthos, which hasbeen licensed and can be the third point of LNG import into the southern part of the country.
5. the design maturity of the East Med pipeline, the implementation of which is linked to developments in the discovery and transport studies of the Eastern Mediterranean gas fields.
6. the implementation of the interconnection between Greece and the Republic of North Macedonia in 2025 with an initial capacity of 1,5 bcm/yr (project under construction).

6.3.3 Measures and policies to promote flexibility schemes, storage and demand responsesystems and ensure country capacity adequacy

The country's security of supply is linked to the construction or maintenanceof strong electricity generation, electricity storage and interconnectivity capacity of the country (as previously developed), in order to providea minimum degree of reliability for the country's energy system. Thedevelopment of this policy proposal has been developed in Chapter 3.6 and analysed in paragraph 3.6.4.

Also in order to ensure capacity adequacy beyond the installation of new power plants and the strengthening of interconnections, the promotion of demand response systems will also play an important role. The aim is therefore, in the coming years, as part of measures to reform thedomestic energy market and strengthen competition, to promote measures to increase the participation of demand, and consumers in general, in the electricitymarket.

The promotion of dispersed low-spatial electricity storage systemsinstalled with RES plants in the provision of consumption to homes and businesses in Greece is possible by means of an appropriate amendment to theinstitutional framework allowing or even obliging the installation ofelectricity storage systems together with any new RES plant or the construction of a new dwelling. The operation of small and medium dispersed storage units in particular willalso be done via virtual units, thus allowing for the optimum technical use of the entire power of these units and in the form of different products to the grid, providing a balancing of power at theperipheral level. It is worth noting that the promotion of electro-mobility can also be a policy measure to promote electricity storage systemsin order to enhance the capacity of the system. Batteries in vehiclesthrough aggregation or even virtual units can become an important instrument – a tool to enhance system power flexibility.

6.3.4 Measures and policies to address energy supply limitation or interruption

As highlighted by the recent energy crisis, the country's security **ofsupply of electricity** is linked to the construction or maintenance of sufficient electricity generation and interconnectivity capacity of the country through international interconnections projects, as well as to the development of electricity storage units of sufficient capacity.

Similarly, in the case of **natural gas**, diversification ofsupply streams is envisaged, by developing new ones and strengthening existing interconnectionswith neighbouring systems, as well as enabling gas storage, both in existing storage infrastructure in neighbouring countries (e.g. Italy, Bulgaria), and in the context of implementation of national and international projects of interest, gas pipelines and storage facilities.

Finally, it is necessary to maintain a sufficient amount of strategic reserves of troughoil.

6.3.5 Measures and policies to increase resilience ofenergy infrastructure bottlenecks

As regards the readiness of the country and the bodies involved to respond to therestriction or interruption of the supply of an energy source, the following are foreseen:

(a) Elaboration of a national energy security strategy in the contextof the National Security Strategy sector by 2025

(b) Development by 2025 of a National Strategy on Cybersecurity of Energy Networks and Infrastructure under the European Directive (EU) 2022/2555 on measures for a high common level of cybersecurity across the European Union (NIS 2 Directive)

(c) Development by 2025 of a National Strategy on Protection and Climate Resilience – Critical Energy Infrastructure under the relevant European Directive (EU) 2022/2557 on Critical Entity Resilience

(D) Preparation of a National Strategy for the Exploration and Exploitationof Critical Mines in Greece under the European Critical Raw Materials Act (CRMA)

6.3.6 Summary of energy security policy measures

The table below summarises the policy measures envisaged to achieve the targets under the energy security dimension.

Article	Name of the politics-measure	Correlation withpolicy priorities	Target	Affected-party	Accusation of a-measure
M1	**New interconnections with neighbouring electricitytransmission systems andupgrades we are vineyards**	**FP5.1, FP5.2;**	IncreaseDifferential, Abrasivedrainage and Preparedness for-response Restriction sacrifice or discontinuation of benefit, GrowthI amrumours Energy	Electricity	Technical measure
M2	**Arrangements forpre-push power demand-response**	**FP5.3, FP5.4**	Demand response increase; Reduction ofenergy suspension	Electricity	Standard-metre
M3	**New interconnections with neighbouring gas transmission systems and renewal of existing gastransmission systems**	**FP5.1, FP5.2, FP5.4**	Increase Difference poetry Preparedness for-response Restrictio n	Natural-wool	Technical measure
M4	**Strengthening measures tocope with demand fornatural gas**	**FP5.3, FP5.4**	Demand response increase; Preparedness for-response Restrictio n	Natural-wool	Standard-metre
M5	**Projects cold store in the fieldof e-energy**	**FP5.3, FP5.4;**	Increase - Differential, Abatemen t demand response and response Preparedness for-response	Natural-wool	Technical measure
M6	**Interconnections NII to reduce electricity productionfrom imported fuels and to exploitlocal RES potential with**	**FP5.1, FP5.3**	Reductionof energy suspension,increase secure catering N viruses, GrowthI amrumours Energy	Electricity	Technical measure

	best value for money		Sources, carbonisation of islands		
M7	**Periodical timeliness Study E capacity park by ADMIE, harvestingof planned measures and introduction oflong-term capacity assurance machinery.**	**FP5.3, FP5.4**	Increase - Differential, Abatemen t demand response and response Preparedness for-response Restriction sacrifice or	Electricity	Standard-metre
M8	**Preservation and-modernisation of the-National Risk Assessment for Natural Gas (includingRiver Petroleum) Memb ers (FA), whenever he/she isrequired to do so in accordance with**	**FP5.1, FP5.4**	Preparedness for-response Restrictio n sacrifice or interruption of benefit	Natural-wool	Standard-metre
M9	**Implementation and monitoring and-refinement Draft Preventive action and emergency plan in the natural gas sector and-adoption of planned measures,including measurestaken mutual-roundtable (solidarity mechanisms).**	**PP5.4**	Preparedness for-response Restrictio n sacrifice or interruption of benefit	Natural-wool	Standard-metre
M10	**Maintenance and-maintenance of dialysisplans Sixth electricity supply needs of the**	**PP5.4**	Preparedness for-response Restrictio n sacrifice or interruption of	Electricity	Normal, Technical measure

	planned my metrics.				
M11	**Maintenance of a Committee for the Management of SeriousDisorders of the Rescue in Oil and/or PetroleumProducts.**	**PP5.4**	Preparedness for-response Restriction sacrifice or interruption of	Petroleum-products	Standard-metre
M12	**Maintenance and-implementation of national measures System Transmissionof electricity (extra-electric imports)energy; Shapes curtailment cargo, Defense Plan, Restoration Plan, etc.).**	**FP5.2, FP5.4**	Preparedness for-response Restriction sacrifice or interruption of benefit	Electricity	Standard-metre
M13	**Maintenance and updatingof the Regulation on Emergency Stocks of PetroleumProducts.**	**PP5.4**	Preparedness for-response Restriction sacrifice or	Petroleum-products	Standard-metre
M14	**Preparation Strategy for:** - **Safety of-helmets ener underground-structures,** - **cyber suffocation — smooth and** - **development Critical before-**	**PP5.5**	**Resilience of critical-energy infrastructure**		**Normal measure**

Table 29 Estimated policy measures for energy security.

3.6 measures and policies for the Internal Energy Market

The electricity market has experienced structural changes in its design and operation in recent years, both at the wholesale and retail level. The need for the additional reforms discussed below has been demonstrated mainly by the recent energy crisis and their implementation requires successful coordination between the institutions involved and market participants. An important challenge for the functioning of the electricity market in the coming years is the unhindered integration ofhigh-stochastic RES power plants and the effective management and participation of newArts such as energy storage and demand response in the markets.

Four (4) key priorities for the measures to be taken in this regard are presented below.

FP6.1 Strengthening competition in the retail market and promoting dynamic pricing – completing the digitalisation of the network

FP6.2: Developing strategies to tackle the energy crisis and protect final customers

FP6.3: Promote reforms to improve the functioning of the electricity market

FP6.4: Standardisation and strengthening of bilateral PPA's conventions and development of new environmental markets

FP6.5: Promote flexibility systems, storage and demand response systems and ensure country capacity adequacy

Figure 15 Policy Priorities for the electricity market 2023-2030.

The key institutional bodies for the implementation of new policies and the achievement of the electricity market are the Ministry of Energy and Energy, the Regulatory Authority for Waste, Energy and Water (RAAY), the Independent Electricity Transmission System Operator (ADMIE), the Hellenic Energy Exchange ('ERA'), the Greek Energy Exchange ('ERA'), the Hellenic Network Operator of the Law ofElectricity ('DEDDIE') and the Renewable Energy Sources and Guarantees of Origin Operator ('DEEP'). Each of the above bodies, in accordance with the obligations and responsibilities laid down in the European and national

the legal and regulatory framework plays a catalytic role in the evolutionof reforms and the achievement of the objectives set by the NECP.

3.6.1 Measures and policies to enhance competition in the retail market and promote dynamic pricing – completing the digitalisation of the network

Measures to fully align with the EU guidelines on the retail electricity market will be promoted with a view to consumer empowerment and protection, transparency and competitiveness among electricity suppliers, as well as the promotion of dynamic and flexible tariffs. The measure concerns the formation by suppliers of a newtype of variable pricing product, which will directly monitor price fluctuations in wholesale markets and in addition enable the consumerto make his load profile appropriate to this variation through appropriate signals received. The product in question will not contain any adjustment mechanism, providedthat the commission charge is entirely based on the Day Ahead Market (ATH) price plus the profit margin of the supplier concerned. Since products of similar characteristics have in the past been provided only to medium and/or high voltage customers, whowere in an apparently different position for the perception of the price formation mechanism, it seems necessary to immediately establish uniform rules for all electricity consumers.

The development of competition in the retail market will enable the high degree of concentration and low consumer mobility to be avoided. However, high energy prices are counter-acting in this direction as theyexert severe pressure on small suppliers at risk of leaving the Greekmarket. The share of electricity supply in the Low Voltage represented by the dominant undertaking (PPC) has decreased from 91 % in 2016 to 63 % in 2022. This reduction is in line with the desired direction for the Greek State, the aim of which is to empower consumers and improve the conditions forcompetition, resulting in a number of benefits for ordinaryconsumers, such as reducing the cost of consumer bills, improving customer service, as well as new solutions and services to meet existing and future needs such as smart home, electrictraffic, net metering, demand response, etc.

Targeted policy measures to **promote dynamic electricity pricing** towards final consumers in order to promote energy efficiency and achieve energy cost reduction. Duplicatebilling will encourage lower consumption during peak periods and promote the use of energy-efficient and smart devices. To achieve this goal, we will strengthen technological solutions that allow prices to be adjusted in line with energy demand and supply. The aim is to encourage – the development of smart meters and devices that allow consumers to monitor their consumption and receive informationon price fluctuations.

The implementation of these measures involves two periods:

- In the short term, suppliers will offer dynamic pricing forthe range of supplies provided by DEDDIE to market operators certifiedwith trustworthy data per 15 minute (Medium Voltage and Low-Voltage Supplies). The noseof e-mobility services should be integrated into the dynamicprice as a matter of priority to incentivise end users-through parallel price signals to achieve green charging.
- In the medium term, the gradual inclusion in dynamic priority pricing of new major supply groups until the installation of smart meters in all Lower Voltage supplies.

The installation of smart meters as a premise: Greece has limited per roll-outof smart meters.

In July 2022, the Network Manager (DEDNO) welcomedthe completion of a tender procedure to select companies that will develop up to 7,7 million smart meters, with additional tenders neededto complete the deployment of smart meters. The offers cover three products:

1) field equipment (units of measurement and point-to-room communicationequipment)

2) advanced metering infrastructure systems (software), and

3) cash data management systems.

In 2022, 100.000 smart meters were installed. The full roll-out of smarttrawls is expected to cost around EUR 1,1 billion. DEDNO will collect and disseminate all smartmeter data and establish rules for market operators to access them, and it is estimated that the possibility of plugging will be reduced to zero,as there will be no possibility to intervene in the meter.Customers will have access to their own data via a dedicated platform (portal). This measure makes amajor contribution to the formation of consumption behaviour and is a-prerequisite for the application of dynamic pricing.

3.6.2 Measures and policies to develop strategies todeal with the energy crisis and protectmaterial consumers

In response to the energy price crisis, the Greek State has adopted a series of exceptional and temporary measures to cushion the effects of the crisis and limit the increase in costs faced by finalconsumers. These measures as a strategy to address an energy crisis can be-summarised as follows:

- In accordance with Article 61 of Law 4839/2021 (Government Gazette, Series I, No 181), the Energy Transition Fund (‘TEM’) was set up, to which revenues flowing, inter alia, from the introduction of exceptional and temporary crisis response measures. Since autumn 2021, the TEM has allocated over EUR 9,3 billion to support Greek consumers.

- In accordance with Article 12a of Law v.4425/2016, a temporary day-ahead market revenue refund mechanism was established, which applies from July 2022 to June 2023 inclusive. The end of this mechanismwas extended twice, i.e. until September 2023 and eventually until December 2023. Under this Provisional Mechanism, a maximum compensation price for each category of production unit was set for each month, the regulated producer's revenue price ('PTEP') and, if the price of each of them exceeds the PTEP for a given time, then, for that time before,withheld revenue in favour of TEM. Over EUR 3,4 billion channelled between July 2023 and the end of 2022 as subsidies to electricity bills of valleurs were channelled through this-mechanism.

In addition to the above measures to establish the framework for supporting consumers in the context of an energy crisis, measures will be taken toprotect tankers, such as the amendment of the Electricity Supply Code, which has not been amended since its adoption (2013), and to addressenergy poverty.

As mentioned above, an important part of the completion and overhaul of the existing regulatory framework governing the electricity supply regime is undoubtedly the adoption of a new Procurement Code in the first months of 2024, which is to modernise and update each electricitysupply so that it is in line with theprovisions of Regulation (EU) 2019/943 and Directive (EU) 2019/944, as well as with technological and digital developments in the market itself, which requiregenerous adaptations. Moreover, the Electricity Supply Code has been the most important tool which helped to achieve the gradual removalof the retail electricity market, while at the same time ensuring and largely pushing both the market and final consumers towards rules of transparency, cost-orientation and well-functioning and organisedmarket conduct. However, the aim is not only to amend and update the existing Procurement Code on the basis of the changes already made to the European and domestic legislative and regulatory framework, but to develop and finally adopt a modern, coherent, complete and ambitious new Procurement Code that incorporates existingand upcoming technological developments, clears and strengthens relations between suppliers and final customers, whilecontinuing to protect and ensure the smooth and regulatoryfunctioning of the market and competition.

In addition, in addition to reforming the framework of the Electricity Supply Code, the State will provide incentives to suppliers, as mentioned above, to facilitate the conclusion of bilateral contractsfor the purchase and sale of thermalenergy with producers, with the aim of reducing the energy costs of tankers, and by enhancing the liquidity of the futures markets, pre-brandersare encouraged to manage more effectively the risk of placingthem on the markets by entering into transactions to hedge risks. Inaddition to the above, Greece's commitment to decoupling prices on the wholesale electricity market from those of natural gas and through the increased penetration of RES, which has a positive impact on the import/export trade balance.

With regard to combating the phenomenon of energy poverty, the current structure of the social household tariff is being improved andit should be reserved for energy-vulnerable households.

Combating energy poverty is a major challenge by 2030 to reverse the effects of this phenomenon, which have been exacerbated by the economic downturn. In order to achieve this objective, it is necessary to plan and implement a coherent and effective strategy, which will loseto the permanent and radical fight against the phenomenon and not to mitigate it temporarily through temporary and short-term measures.

The Greek State intends to address the particularly acute problem of current theft, by tightening the framework for offenders, in particular by adopting policies such as increasing financial penalties for such cases, to the benefit of society as a whole.

3.6.3 Measures and policies to promote reforms to improve the functioning of the electricity market

Introducing 15pcp of products in the electricity markets

The Greek Energy Exchange as the Electricity Market Operator ('NEMO') has already begun the relevant preparation regarding the adaptation and improvement of all its systems in order to introduce 15 minutes of continuous trading in the Day-Ahead Market and the continuous IntradayShelter for the Greek Tender Zone. On the basis of Commission Regulation(EC) No 2019/943 on the internal electricity market, NEMOs allow market participants to enter into transactionsat intervals that are at least as short as the imbalance settlementperiod (i.e. 15 minutes). The aim is to make the products available also at pan-European intraday auctions, which are scheduled to be launched in 2024, and then at pan-European level in 2025 on the Day Ahead Market. Similar interventions shall be launched on the internal infrastructure of the Electricity Transmission System Operator (ADMIE), as well as on interconnections, in order to ensure their smooth operation under conditions that will dominate 15-minute trade in the Day Ahead Market and the Intraday Market.

The implementation of this is linked to progress in unpaired markets. TheGreek electricity market is bordered by both paired European markets (see Bulgaria and Italy) and uncoupled, such as Albania, NorthernMacedonia and Türkiye. Thus, special care should be taken to move forward with the introduction of 15-minute products/transactions in the unpaired markets, as otherwise the Greek market will have to keep 60 minutes of products, as is the case now, in order to trade electricity with the non-coupled markets.

Measures for market monitoring and lifting restrictions

In the context of constant market surveillance by RAEW, in particular dueto the energy crisis, the Greek State aims to restore market conditions which will increase competition and provide the necessary signals to attract the investments needed for the energy transition. A key step in this direction is the gradual lifting of the temporary measures introduced in the context of the energy crisis, in order to restore themarkets to function freely in accordance with the European framework, while maintaining their endless monitoring and surveillance. In the same vein, it is necessary to restore the functioning of the markets due to other constraints since the opening of the markets under the Target Model, in order toaddress individual and temporary issues of new markets.

The regional role of Greece and the achievement of interconnectivity

Taking measures to continue projects to build new interconnectors and strengthen existing ones is a key priority to strengthen Greece'srole. Examples include the completion of the new interconnector between Greece and Bulgaria (Maritsa – Nea Santa), but also the investigation to strengthen the interconnections between Greece and the Republic of NorthMACP and between Greece and Türkiye. In addition, the interconnection with Crete supports the prospect of interconnection between Greece and Cyprus and, via Cyprus, with Israel. Finally, it is proposed to explore the possibility of improving the reliability of existing interconnections.

It is important for the efficient allocation of interconnectors capacity ina secure manner by calculating it through a common coordinated methodology to take into account at regional level the state of the networks of changing RES flows and price volatility.

The successful operation of the Regional SecurityCoordinator (RSC) based in Thessaloniki, which brings togetherthe Greek System Operators of Bulgaria and Ruma, isa very positive development within the above-mentioned framework. The promotion of acceptance of the European legislative framework by third countries such as those participating in the Energy community and their participation in the RSC is necessary to extend the harmonised management of interconnections and toachieve interconnectedness.

Addressing the problems of public acceptance in the construction of new interconnectors is crucial to address them early. The early involvement of local communities, as also provided for inthe TYNDP guidelines, should be pursued.

In the context of international interconnections, cooperation has already been launchedat regional level with the following countries:

Albania	**Cyprus**
Bulgaria	**Republic of North Macedonia**
Israel	**Türkiye**
Italy	**Egyptian**
Germany	**Saudi Arabia**

Financing the above political priorities and measures at nationallevel at national level, including with Union support and the use of Union funds

The main funding tools include:

- Domestic resources
- Projects of Common Interest (PCIs)

3.6.4 policies and measures to standardise and strengthen bilateral PPA's contracts and the development of new environments fordomestic markets

The new ERA Platform for Strengthening Bilateral PPA's Conventions

The great interest in investment has highlighted the need to establish aplatform for sailing bilateral RES energy contracts (RES PPAS Platform). The BasquePrinciples and the structure of the Platform shall aim to:

- strengthening the development of new RES projects on market terms, as their viability and financing will be ensured – as most of them –by State aid schemes;

- enhancing the choice of smaller participants on both the seller and the buyer's side (off-taker)

The Energy Exchange carried out a market survey to demonstrate the interest in the market as a whole and, more specifically, the real intentions of the participants to move towards green bilateral contracts. Theabove will also form the basis for the proposal that will eventually be submitted tothe Regulatory Authority with a view to starting the process of-sealing the measure. The RES PPAS Platform is expected to be operational in 2024.

The new DAPEEP platform for Guarantees of OriginAuctions

By the end of 2023, it is expected that the Renewable Energy Sources and Guarantees of Origin Operator (DAPEEP) will conduct the first auction for the award of Guarantees of Origin, as part of the trading system legislated in 2022 and amended the way in which ‘green’ certificates were obtained in Greece. This will pave the way for increasing financial revenues towards the SpecialRestoration of Renewable Energy Sources (ELRES), through auction revenues.

The first auction is the next objective set in the end of 2023, following the successful completion of the interconnection of the Greek Register of Guarantees of Origin (OP) with the corresponding European registers. This achievement has now opened the doors to all European markets for the Greek ‘green’ products,as the issuing bodies are also members of the European Association of Guarantees of Origin Operators (AIA). It is expected to increase the valueof the Guarantees of Origin, as it will create possibilities to serve the large consumers and suppliers of electricity towhom the Greek green certificates are based.

Voluntary Carbon Market

The development of the Voluntary Carbon Credits Markets (VCMs) is being explored in Greece as the measure will further support a number of objectives:

- It will offer private sector companies further possibilities to reach the zero-emission target, in addition to those set by the EU Emissions Trading System (EU ETS).
- It will create opportunities to support local efforts to reduce and remove carbon emissions and will also strengthencapital flows in programmes that allow carbon offsetting.
- The voluntary market will strengthen the response to climate change issues and the implementation of policies to reduce and avoid greenhouse gas emissions.

With the completion of a VCM market, it will be possible for the first time within the EU to access products and services relatedto voluntaryCO_2offsetting, in addition to the Compliance Market in an ‘EU EmissionsTrading System’ (EU-ETS). Among other things, this is afantastic step towards aligning Compliance and Voluntary Markets in the context of Article 6 of the UN.

3.6.5 measures and policies to promote flexibility systems, energy storage and demand response systems in the markets

In the next period (early 2024), the regulatory framework for the full participation of storage as well as demand response in all electricity markets, including the balancing market, is expected to be completed. Accordingly, both services (demand responseand storage) will be fully eligible to **participate ina Capacity** Remuneration Mechanism proposed in the future.

Participation of storage in electricity markets

In 2023, a public consultation was launched on key principles for the participation of storage systems in the electricity markets, taking into account the specificities of these technologies. Following the consultation, an amendment to the regulatory and regulatory framework has been launched to replace the full integration of storage systems into the Energy Markets by the end of 2023. Based on current planning, Storage Systems are envisaged to participate as allocated Balancing Service Entities, with the right to participate in all energy markets and all successfulenergy and power products. Ensuring full and equal participation of Storage Systems in the Energy Market is a crucial part of thecountry’s energy transition and a milestone for the electricity market, as it improves market flexibility and liquidity. In addition, a significant contribution to the provision of reserves is expected, especially given the potential of storage systems to provide reserves without the parallel supply of energy, which is not possible from most balancing service technologies. As a result of theintegration of storage systems in the energy markets, it is expected not only to increase the margin for penetration of RES energy in the energy mix, but also tobetter handle congestion, as well as to improve operational security and the proper functioning of the transmission system.

Participation of demand response in electricity markets

The regulatory framework for demand response was completed on 30 June 2022 by Law v.4986/2022, which added the relevant articles to Law v.4001/2011 and was activated for the first time at the end of April 2023. In this context, the Regulations of the three electricity markets of the Target Model, the MoneyMarket, the Intraday Market and the Balancing Market were amended in order to incorporate demand response into their operation, including high-efficiencyelectricity and heat efficiency (SYSTAF) units. The changes follow the adoption of Law 4986/2022, which adopted into national law EUDirective 2019/944 on common rules for the internal market in electricity, and are contained in the recommendations under consultation of the Energy Exchange and ADMIE, which manages the Balancing Market.

The new entities, i.e. Cumulative Demand Response Bodies and Consumers, will now be able to operate on the markets and submit tolls for each distributed load portfolio they represent. A prerequisite for greater penetration of consumer response in the electricity markets isthe installation of smart meters on the grid.

Participation in the European Energy Balancing Platforms

On the basis of Commission Regulation (EC) No 2017/2195 establishing a guideline on electricity balancing,European platforms are being set up for the imbalance netting process (IGCC), the change of balancingenergy from automatic frequency restoration reserves (PICASSO), manual frequency restoration reserves (MARI) andreplacement tools (TERRE) in order to ensure optimal management and enhancedexploitation of the European electricity transmission system, while supporting the achievement of the Union's RES penetration targets.

The participation of Greece in the European platforms is an important milestone towards achieving the objectives of the Plan, as it promotes increased competition, transparency and efficiency of the balancing market and the electricity transmission system, while supporting the implementation of the Union's RES penetration targets. At the same time, it facilitates the efficient functioning of the intraday market by enabling participants tolive their own equilibrium as close as possible to the actual one. In 2023, a proposal to amend the current legislativeand regulatory framework was submitted for public consultation in order to support participation in the respective market for automatic and manual frequency restoration-reserves, while the necessary steps are under way to upgrade and/or amendthe structures required.

Article	Name of the live-growingmeasure	Correlation with-PolarPriorities	Target	Affected sector	Category of Measure
M1	Strengthening-electricity interconnections with neighbouring countries.	PP5.3	Electricity interconnectivityENR land Adequacy electric system Flexibility energy system Protection ofsculptors Improvingcompetition Energy poverty	Electricalenergy	Technical-measure
M2	Support forstorage projects eu citrate energy	PP5.5	Electricity interconnectivityENR land Adequacy electric system Flexibility energy system Protection ofsculptors Improvingcompetition	Electricalenergy	Technical-measure
M3	Aid for projects inthe area andforged Da kettle	FP5.1, FP5.5	Electricity interconnectivity ENR land Infrastructure for-transport and distribution ofneedles Adequacy electric system Flexibility energy system Protection ofsculptors Energy poverty	Electricalenergy	Technical-measure

M4	Continued-implementation reform to improve the buy e-in citrate energy	FP5.3, FP5.5	Protection ofsculptors Improvingcompetition	Electricalenergy	Regulatory measure
M5	Continuing to take-measures for the twinning ofthe market or the-vertebrate ENR land with the markets of nearbyearthes.	PP5.3	Consolidation market energy Protection ofsculptors Improvingcompetition	Electricalenergy	Regulatory measure
M6	Take measures to-enforce demand-acceptance and the participation of demand in the wholesalepurchase ofelectricity.	PP5.5	Protection ofsculptors Improvingcompetition	Electricalenergy	Regulatory, technical-measure
M7	Improvement shape the SocialSchedule.	PP5.2	Energy poverty Protection ofsculptors	Domesticmeter	Financial measure
M8	Take measures to-protect people from highmarket prices	FP5.1, FP5.2	Protection ofsculptors	Total the final energy consumption	Regulatory measure
M9	Improvementshape migration vulnerable home of customers with the status of theCatholic Service.	PP5.2	Energy poverty	Domesticmeter	Regulatory measure
M10	Promotion young people purchasing tools and new environmental products	PP5.4	Protection ofsculptors Improvingcompetition	Electricalenergy	Financial measure

Table 30 Electricity Market Policy Measures.

3.7 measures and policies to exploit critical mineral raw materials

In addition to the tendering procedures for the exploitation of mature KPY deposits, which will contribute to the EU's security of supply of raw materials,other policies and actions are being taken, which can be summarised as follows:

1. Complete the WFD specific spatial planning, which will ensure the accessibility of deposits of strategic interest over time and even improve the sector's social acceptance by reducing potential frictions with other competing land uses.

2. Legislative and regulatory measures to improve theregulatory framework for mining activity. Theexisting mining legislation needs to be reconsidered in three axes:

adaptation of the rules to the current socio-economic situation and investment needs, but also with European standards,with a view to improving the mining climate

b/in combination with corresponding interventions in the environmental andforestry areas, the permitted land uses, in particular within protected rivers, the licensing and management of extractive waste, and the subsequent uses of the sites (Post mining).

the establishment of a coherent framework that does not create precariousness for those active and investing in the mining industry, but atthe same time helps to create public confidence in the state's management of rights.

3. Strengthening existing investments in the exploitation of Greek ferro-nickel-nickel deposits (cuttles), bellite deposits, magnetos deposits and mixed sulphide ores, with the consequent launch of interventions to encourage the production of critical and strategic minerals contained therein.

4. Promotion of circular economy projects. Development of systems and policies to encourage recycling, processing for final product production and reuse of critical minerals and their waste, sustainable and socially responsible sourcing of raw materials in line with the quantitative objectives of the European CriticalMaterials Regulation.

5. Diversification of supply sources. Strive to find anddevelop alternative sources of critical minerals and explore new new technologies that will reduce the environmental footprint ordispose of them.

6. International Cooperation: Collaborate with other EU Member States and global partners to share know-how in exploration, extraction and processing of COPs. Approach to new methods for the extraction and processing of OPW ores, concentrates and wastes by-innovative enrichment and metallurgical processes (e.g. Ga, Ge, Sb, Ni, Co, etc.)

7. Broadening social cooperation. If Greece is to move smoothly from the current situation to a situation with at least 10 % growth in mining, important interventions are also

needed **to improve civil society's opposition to the mining sector**. Interventions that result-in the development of the substance of mining in our collective value capital and substantial initiatives aimed at improving the levelof social acceptance of mining projects and ultimately mitigating or removing theestablished negative perception of these projects ('social permit'). Within the next 6-7 years, therefore, targeted collective information and public-opinion programmes and the transmission of the right message to the recipientsare needed.

Targets for research up to 2030

1.Clearance survey:

Funding is a crucial point for the continuation and further development of OPY research (which is difficult and complex e.g. deep drilling, with high risk and geological uncertainty). Therefore, in order for research to go beyond whatis necessary, appropriate financial work should be put in placeboth at national level and use should be made of existing Community level.

The predominant quality objective, i.e. targeted geological survey and search-survey in areas of high interest, requires expenditure of the order of 100 million, according to the-estimates of the Association of Mining Enterprises (PIC). EUR [...], by 2030.

2.Research innovation:

It is proposed to support and encourage research programmesaimed at developing alternative materials and metallurgical processes orimproving the recycling of critical minerals, with the cooperation of research institutesand research institutes in Greece (for example. HORIZON).

3.8.3. Targets for exploitation by 2030

The increase in the EU's self-sufficiency rate from ~ 2 % today to 10 % with a view to 2030, which is in line with the European Regulation on Critical Raw Materials, means an increase of at least 400-500 % in mineral production,with the utilisation of the Critical Raw Materials Regulation, within the next 6-7 years. In**order to achieve the target**, in the coming years up to 2030, the Ministry of the Environment and Energyplans to progressively promote international tenders for the lease of exploration and exploitation rightson public utilities, which will be judged positively on the basis of the above criteria. Inparticular, planning includes **annual international tendering procedures,which should include at least one (1) of the strategic and critical minerals and metals each year.**

Please note that, according to the data of the Ministry of the Environment and Energy, the number of PPPs under assessment exceeds 120, some of which are of interest to KOPY-SOPY and are therefore being considered for opening tenderingprocedures for leasing and exploiting them. The assessment of the TDIs is carried out by the Ministry of the Environment and Energy in cooperation with NEAME.

Any prospect of exploitation must be accelerated in view of the longperiod – ~ 8-10 – which is required for the start of a mining project, from exploration to licensing and the start of theprocess of a mining project, so that the 10 %target for the production of critical mineral raw materials from naturaldeposits, including Greece, can ultimately come to hope that the target of will be reached. It goes without saying that it should be possible for CGPP projects to have access tothe funding provided for by the EU funds (NSRF, Just Transition Fund, Re☐, InvestEU, Innovation Fund) and the ECB.

CHAPTER 4: OVERVIEW OF IMPACTS AND INVESTMENT NEEDS

4.1 Energy prices in the green energy transition

As mentioned, the green energy transition focuses on the significantly increasedparticipation of RES in electricity generation in order to reduce the carbon footprint of electricity and thus expand its use in theearth system. As a consequence, the future electricity price formation will be of great importance for the costs of the transition.

The cost of fossil fuel generation has risen significantly in recent years due to the increase in carbon costs due to the cost of purchasing emission allowances from the EuropeanETS auctions. In addition, the cost of fossil fuel generation is veryexpensive and may be subject to large fluctuations due to international gas prices, as demonstrated by the large price crisis in 2022.

Consequently, the increase in the share of RES in electricity generation provides consumers with stability of the cost of electricity generation as a whole. Through financiallitigation contracts and similar other economic instruments and the private sector, it is perfectly possible for the fixed and cheap costs of RES to be directly reflected in the electricity costs of final customers.

The NECP estimates that thanks to the continuously decreasing costs of RES investments, for all technologies, including offshore wind, the total costs of electricity, including generation costs and the costs of electricity grids, will be constantly decreasing in the future, despite the Frenchtransformation into a system with the absolute dominance of RES. The cost of-electricity in a system that dominates RES depends not only on the cost of RES, which is already very small and further reduced in the future, but also on the cost of energy and storage to complement and balance RES and ensure reserves and ancillary services. These costs are partly dependent on natural gas but will increasingly depend on the cost of electricity storage, which is capital intensive and is currently stillrelatively high per unit of energy stored. The cost ofactions, ancillary services and energy complementing RES is relativelyhigh because plants, including thermal plants using currently and gradually renewable gases in the future, will have little use, and will therefore need to recover the cost of employing capital through the cost of the services provided in the system and other mechanisms to ensure that their capital is remunerated.

However, the calculations for the NECP, as in all other EU countries, show that, despite the increase in the cost of energy that it complements, balances and stores RES, the total cost of electricity generation per unit, which, far from falling,will continue to decrease in the future, thanks to the cheap and decreasing costs of RES.

Consumertariffs also pay to recover the capital intensive costs of electricity grids. Already today, theaudited programmes for the development of low and medium voltage networks by DEDDIE and the high voltage networks by ADMIE, which include internationalconnections and the major project of interconnecting all islands, have anticipated the growing demands of networks in the context of the NECP objectives and the high development of RES. The projected network charges have increased somewhat withthe past due to the increased investment required.

Table 17 summarises the projections for electricity prices and production and transmission and distribution costs.

Table 31: Summary of NECP projections for the average price and cost of electricity in the future

NECP (Apr 2023)	2021 (estimate)	NECP 2019 for the 2030	Central scenario					
			2025	2030	2035	2040	2045	2050
Average annual consumer price (before excise duties and VAT) in constant Euro								
Average consumer price before tax and VAT	187.1	140.8	149.5	132.6	118.9	115.3	111.2	109.8
Unit cost of electricitygeneration	135.3	91.0	105.6	84.2	76.0	73.8	70.3	70.1
— cost of capital and maintenanceof electricity generation	55.5	59.8	52.9	65.3	63.7	60.4	60.5	59.6
variable cost of conductor-electronics	79.8	31.3	52.6	19.0	12.3	13.4	9.8	10.5
Fees, miscellaneous charges, costs of sales	29.2	18.3	19.6	19.7	14.1	8.2	8.0	7.0
Costs of distribution networks and distribution networks	22.5	31.4	24.3	28.7	28.8	33.3	32.9	32.7

Estimates of average prices and costs in 2021 (and thus 2022) take into account high gas costs. It is assumed that gas prices stabilise in the future but at levels higher (around 35-40 %) of thezero values observed before the crisis that started in 2021. In addition, it is assumed that carbon prices are escalating towards high levels in the future, starting slightly below EUR 90/tCO2 in 2023 and exceeding EUR 100/tCO2 already before 2030. The assumptions about future gas prices and emission allowancesunder the ETS were much lower in the previous NECP ingeneral than in the present NECP. These low price assumptions explain that the previous NECP had calculated relatively low electricity prices and costs in the future. This NECP, despite the assumptions of higher gas and emission allowance prices, projects low prices with a tendency to continuously decrease for electricity, as shown in the table above.

The structure of decreasing electricity costs includes the cost of electricitygeneration that is steadily decreasing in the future, despite the increasing costs of interlocking, balancing and storing RES energy, and network costs which are increasing in the future due to increased network investments. The cost structure of electricity generation is constantly shifted from variable costs to fixed costs for capital employed and equipment maintenance. Variable costs tend towards a minimum percentage in the long term.

4.2 Costs for consumers and investments

It makes sense to assess the costs of the energy system, which includes energy production, transmission, distribution and consumption, from the perspective of final customers. I.e. households, buildings, agriculture, industrialengineering and the transport sector to serve energy services such as heating, cooling, industrial processes and transport. The cost of these useful energy services from the point of view ofconsumers is not only the cost of purchasing energy products but also the cost of capital employed by the final consumer for his own equipment and devices for producing the useful energy services as well as the investment costs for energy savings. Even for households,the cost of useful energy services includes not only the cost of purchasing energy services but also the annual indirect costs of servicing investment costs for energy and saving energy in the dwelling as well as for the purchase of durable goods such as appliances and privateamenities. Taking into account that the costs paid by final consumers arepresumed to correspond to the full recovery of the costs of production, supply and supply ofenergy products by the respective companies, it ultimately follows that theenergy price, in the sense of the cost to the economy of obtaining the shell ofenergy services, is only what is borne by finalenergy suppliers for the same purpose, which includes, on an annual basis, the cost of-energy products and the annual equivalent cost of capital employeddirectly or indirectly by the final consumer himself to acquire the bestenergy services. Calculations of the costs of useful energyservices from the perspective of final customers were made in the context of the NECP. Table 18 summarises the cost calculations.

Table 32: Summary of cost calculation for the economy for usefulenergy services

NECP (Apr 2023)	2021 (acet-) b)	NECP 2019 for the 2030	Central scenario 2025	2030	2035	2040	2045	2050
Annual consumer costs for energy, including investments in efficiency, purchase of appliances and vehicles, and purchase of energy products								
Total annual expenditure (EUR million)of consumer fees for energypollution (no ETS payments)	35,264	40,075	43,731	44,884	44,254	47,376	46,776	48,133
as% of GDP	19.4 %	19.3 %	21.8 %	21.6 %	20.1 %	19.8 %	18.0 %	17.1 %
Total costs (EUR million) for the purchase of CO2 allowances	455	825	1	1,146	1,802	2,067	1,149	162
Total annual expenditure (EUR million)of consumer fees for energypollution (with ETS payments)	35,719	40,9	44,732	46,03	46,056	49,443	47,924	48,295
Total expenditure (EUR million) for the annual serviceof investment capital	11,876	17,145	15,2	18,93	20,123	22,918	22,284	23,881
Total expenditure (EUR million) for the purchase of energy products and other-indirect costs	23,843	23,755	28,417	24,809	22,344	21,814	21,463	21,192

Industry – annual expenditure (EUR million) fornascent services	3,481	2,97	3,045	3,095	3,252	3,633	4,041	4,058
— expenditure (EUR million) for the annual costof investment capital	204	333	250	380	542	726	826	860
— expenditure (EUR million) for the purchaseof energy products and other products	3,278	2,637	2,795	2,715	2,71	2,907	3,215	3,198
Household sector – annual expenditure (EUR million) on energy services	12,527	15,282	14,324	14,953	14,146	15,165	14,283	15,028
— expenditure (EUR million) for the annual costof investment capital	5,565	9,28	7,743	9,747	9,791	10,672	9,965	10,932
— expenditure (EUR million) for the purchaseof energy products and other products	6,961	6,002	6,582	5,206	4,355	4,493	4,318	4,096
Services and agriculture – annual expenditure (EUR million) on energy services	6,47	7,145	8,286	8,186	8,279	9,165	9,196	9,026
— expenditure (EUR million) for the annual costof investment capital	1,942	3,213	3,447	3,973	4,405	5,385	5,578	5,521
— expenditure (EUR million) for the purchaseof energy products and other products	4,528	3,932	4,839	4,213	3,874	3,78	3,618	3,505
Transport – annual expenditure (EUR million) for energy services	13,24	15,502	19,068	19,756	20,29	20,928	19,68	19,417
— expenditure (EUR million) for the annual costof investment capital	4,164	4,172	4,571	6,175	7,19	8,227	8,22	8,861
— expenditure (EUR million) for the purchaseof energy products and other products	9,076	11,33	14,497	13,581	13,1	12,7	11,46	10,555

It should be noted that the above calculations include the costof purchasing vehicles or means of transport of all kinds, the costof acquiring all types of energy-using appliances and equipment in all sectors,and the cost of developing energy efficiency in all sectors.

The relevant indicator is the proportion of annual total expenditure on energy servicesin terms of Gross Domestic Product (GDP in volume, with theeffect of inflation) as energy expenditure usually increaseswhile at the same time the economy is growing as measured by GDP. Table 19shows that the green energy transition is designed to realise the full energy transformation to eliminatethe use of fossil exhaustand GHG emissions with overall macroeconomic costs only slightly higher in the medium to years (21.3 % of GDP in 2030) than in the past (around 19-20 % of GDP),but with a tendency to decline further and to be at the same and lower levels as a percentage of GDP after 2030. In other words, the green energy transition payslittle to the cost of energy in GDP and even reduces it after 2030. It is therefore not true that the elimination of emissions is expensive and a burden on the cost, but rather represents an opportunity for new economic growth from new, investment and substitution of imported fossil energyproducts.

The cost structure is transformed across sectors. The share of costs corresponding to variable costs is constantly decreasing and the part corresponding tofixed capital service costs increases steadily. The transformation in all sectors uses capital-intensive technologies as well as investments toimprove energy efficiency.

As a consequence, the important economic condition of the green energy transition is easy and cheap financing of investment costs in all sectors of final energy consumption, including the costs of purchasingappliances, armaments and advanced vehicles, as well as investmentsin energy-saving.

The table below summarises the projections for investment expenditure.

Table 33: Summary of investment expenditure by sector

NECP (Apr 2023)	2016-2016-2021 (averageyear)	NECP 2019 (2026-2030, instrument year (Ko)	Central scenario					
			2021 — 2025	2026 — 2030	2031 — 2035	2036 — 2040	2041 — 2045	2046 — 2050
Average expenditure on investment and purchase of appliances and vehicles – per year as a five-year average								
Total end-of-pipesectors	16,013	17,826	20,384	25,464	21,252	24,488	23,377	25,643
— as% of GDP	9.4 %	8.7 %	10.9 %	12.4 %	9.9 %	10.6 %	9.3 %	9.4 %
Total excluding transfers	5,133	5,827	9,480	9,846	8,018	9,294	7,611	8,924
— as% of GDP	3.0 %	2.8 %	5.1 %	4.8 %	3.7 %	4.0 %	3.0 %	3.3 %
Industry (for constructiononly)	117	133	124	255	333	383	246	163
Residential	3,239	4,342	6,235	6,985	5,652	5,712	4,814	6,226
— Energy upgrading of buildings	362	620	483	811	855	707	716	694
— Purchase of appliances and-scraping	2,877	3,722	5,752	6,174	4,796	5,005	4,098	5,532
Services buildings andland	1,777	1,352	3,121	2,605	2,034	3,199	2,551	2,535
— Energy upgrading of buildings	71	162	167	119	111	93	81	67

— Purchase of appliances and-scraping	1,706	1,190	2,954	2,486	1,923	3,106	2,470	2,468
Transport (purchaseof vehicles and means of transport)	10,879	12,000	10,904	15,618	13,234	15,194	15,765	16,719
Total energy production and distribution sectors	1,267	2,539	2,996	3,679	6,412	5,868	7,870	5,405
— as% of GDP	0.7 %	1.2 %	1.6 %	1.8 %	3.0 %	2.5 %	3.1 %	2.0 %
Electricity generation (units)	562	1,046	1,542	1,766	2,915	2,804	4,436	1,844
Heat (boilers etc.)	18	19	13	14	8	26	— —	4
Distribution and transmission of-electric energy	333	909	822	976	1,064	1,047	1,029	888
Alternative fuels	0	151	32	387	1,947	1,590	2,035	2,335
Gas and oil system	334	364	573	445	380	321	301	296
Biomass – biomethane	20	49	14	92	98	79	70	38
Total investments	17,280	20,366	23,380	29,143	27,664	30,356	31,247	31,048
— as% of GDP	10.1 %	9.9 %	12.5 %	14.2 %	12.9 %	13.1 %	12.4 %	11.4 %
Total excluding transfers	6,401	8,366	12,475	13,525	14,430	15,162	15,482	14,330
— as% of GDP	3.7 %	4.1 %	6.7 %	6.6 %	6.7 %	6.5 %	6.1 %	5.2 %

From a macroeconomic perspective, the ratio of investment expenditure to GDP is relevant. The green energy transition needs an increase in investment expenditure as a percentage of

GDP compared to the past. This increase is in the order of two percentagepoints of GDP over the medium term. This increase decreases towards a level of one percentage point after 2030. Most of the investment expenditureis spent in the transport sector and relates to the cost of purchasing vehicles and other means oftransport, which will require more investment than in the past to replace it with advanced means of transport in terms of efficiency and use of climate-neutral fuels, suchas water and hydrogen.

Investment costs outside the transport sector need to beincreased in all sectors. As a percentage of GDP, this increase is in the order of two to three percentage points over the entire time horizon of the plan.

The energy upgrading programme for dwellings and buildings needs to be increased two or three times a year compared to past programmes. Increased costs forpurchasing efficient advanced devices, such as heat pumps, and vehicles, such as electric cars, should be added to these costs. As a result, households, all income categories,are well placed in the green energy transition to bear a significant increase and share of total investments. It is crucial to make it easier for householdsto supply them with a view to doing so. It should be noted that the annual equivalent cost of useful energy services (i.e. heating, mobility, etc.) is steadily decreasing for households, but this is conditionalon sufficient liquidity to make the relevant investments and increased costs for the purchase of durable goods. Investments in energy production and supplysectors are also increased in the context of the green transition, but their financing is easy and recoverable.

4.3 The budgetary impact of the green transition

The transition towards climate neutrality will change the energy mix in the demand for energy products. The demand for fossil fuels, mainly mineral oils in the transport sector, which due to their high tax yieldsignificant rheological revenues to the Greek State, will be reduced to the benefit of themost energy-friendly products which will not be taxed in order to be marketed. The resulting fiscal gap should be covered by new taxes that should be designed not to oppose or negativelyaffect the transition towards climate neutrality.

Achieving improved energy efficiency requires a significant increase in household spending on investments for the energy upgrading of homes and the purchaseof durable goods (advanced appliances and cars). Reduced liquidity and lack of access to lending by medium and low income households discourage the investment needed for thelong-term performance. It is necessary to implement a subsidy programme for theenduring upgrading and replacement of appliances, as is already the case in ElAlada. Subsidies will be needed on a smaller scale also in other sectors, suchas small businesses and innovative green investments. The other energy sector, energy production and consumption, including infrastructure, will not need subsidies from the State because, under certain conditions, the energy transition is itself financed in these sectors, such as RES, grids, etc. The prerequisites for these sectors are that state policy should foster entrepreneurship and facilitate the financing and leverage of investments and innovations. In viewof this, the energy transition brings about fiscal challenges due to lower tax revenues from mineral oils and increased subsidies to economically weaker consumers.

4.4 Investment impact of the green transition

The green energy transition is bringing about a change in the structure of the cost of energy services by increasing capital intensity and reducing operating costs across all sectors of energy consumption and production. The consumption sectors requireincreased investment costs for energy savings and the purchase of energy-efficient appliances, machinery and vehicles, which at the same time reduce operating costs as a result of a reduction in the purchase ofenergy products. In the energy production and transport sectors, RES, green hydrogen and synthetic fuels, storage technologies and networks have minimal operating costs and mainly have capital intensivecosts.

As a consequence, the green energy transition brings about a significant increase ininvestment and its success depends on the ease of financing in the economy. High borrowing costs or difficulty in accessingcapital will discourage financial actors from undertaking the investment bydelaying and increasing the costs of the green transition. At the same time, new energy investments are linked to a wide networkof increased activity in the supply chain and in the provision of specialised construction, support, digitalisation and innovation services. All the sectors concerned make upa significant proportion of the domestic economy, as they serve, indirectly or directly, technological change in the energy, industry, buildings and transport sectors.

New skills, the development of new businesses, investments and their support involved in the green transition represent a great challenge and an opportunity for jobs, entrepreneurship and growthin economic activity. This is because, in essence, the green transition largely substitutes imported products such as petroleum products and natural gas with technologies such as RES, energy efficiency and green hydrogen, for which a significant proportion of them corresponds-to domestic value added. Optimising this benefit for the economy depends largely on the economy's financial capacity to leverage investment in new technologies and the whole supply chain and thus increase opportunities for domestic value added. At the same time, easy financing reduces the costs of the green transition for householdsand businesses as capital servicing costs will be critical due to increased capital intensity.

4.5 Governance of the green transition

The transition of the energy system towards climate neutrality requires joint action by all economic actors (households, private and publicparties), as does the NECP. The 'green transition' is a complex process that requires major changes in the way we produce and consume energy. It includes the substitution of fossil fuels by products and services related to renewable energy sources and energy-efficient equipmentand leads to increased investment in low-carbon technologies. Innovation, development and high diffusion of environmentally friendly spin-offs,a shift in consumer behaviour towards energy-efficient weaponisationare crucial points that should be designed and supported by state policy in a consistent and long-term perspective. At the same time, it is important through targeted subsidies to avoid-burdening financially weak households and businesses that will also have to increase their investment in the transition.

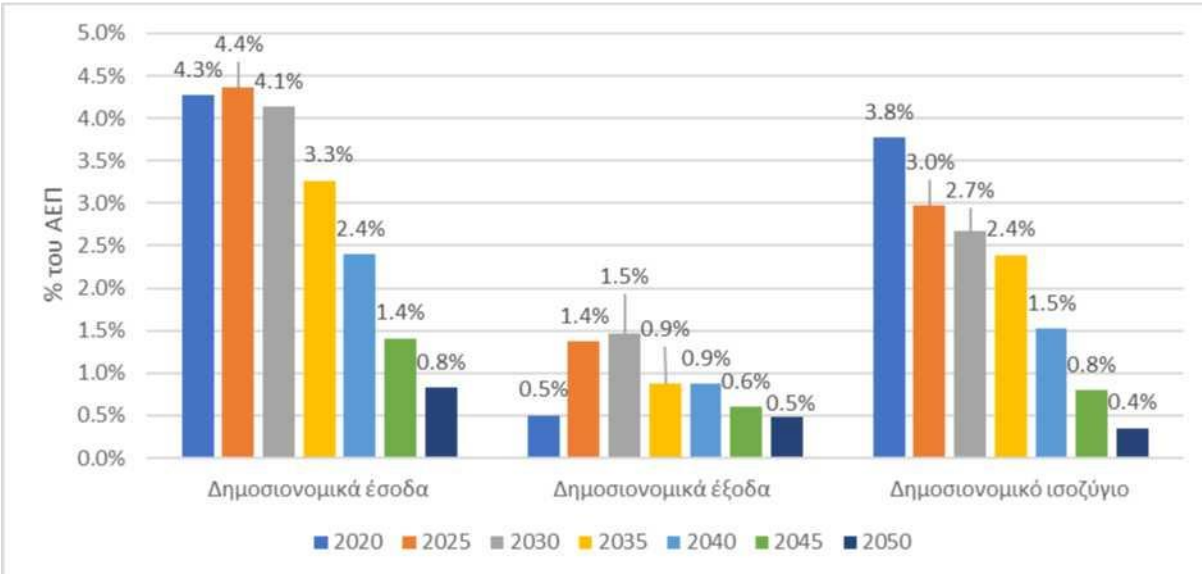
4.6 Quantitative elements

This Annex sets out quantitative data derived from the projections of the mathematical model for energy and transport. Fiscal revenues related to energy and the transition to climate neutrality are expected to increase to 4.4 % of GDP in 2025, with the transposition of the European Committee on Energy Taxation Directive, and to be significantly reduced by 2050, to below 1 % of GDP if no new taxes are introduced, mainly due to reduced demand for fossil fuels that contribute significantly to tax revenues.

The budgetary costs related to energy subsidies and public sectorspending on energy show a significant increase in 2025 and 2030 at 1.2 % – 1.7 % of GDP and gradually de-escalate after 2030.

Thecomposition of budget revenue and expenditure reflects the significant pressure on the budget balance for energy in 2030, which showsa specific mono-gap of 1 % of GDP compared to 2020. In addition, the gradual contraction of the surplus, by 2050, suggests that new taxes should be introduced to maintain fiscal revenues at a level, provided that they do not oppose or negatively contribute to the transition towards climate neutrality.

Figure 16: Fiscal revenue, expenditure and balance related to energy and the transition towards climate neutrality.



The transformation of the energy system towards climateneutrality generates significant sector-specific investments in renewable energy technologies and energy efficient equipment spending.

Table 34: Average annual investment and consumption expenditure on energy efficient equipment for the energy transition towards climate neutrality by sector

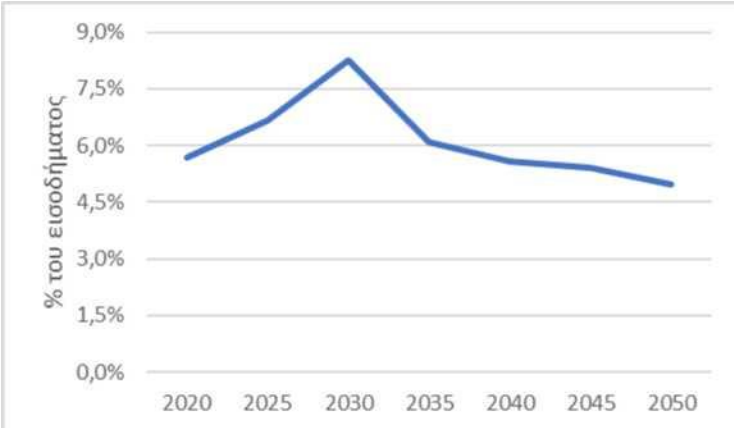
Average annual investment/expenditure (billion EUR)	15 – 20	20-25	25-30	30-40	40-50
Total	**15,2**	**20,7**	**24,7**	**23,7**	**26,8**
Households	**6,7**	**9,2**	**11,6**	**9,1**	**9,6**
Means of transport	4,7	4,2	6,7	5,8	6,2
Renovation of buildings	0,4	0,6	0,9	0,8	0,7

Energy appliances (cooling, heating)	0,5	3,3	2,6	1,1	1,2
Electrical appliances	1,1	1,2	1,4	1,5	1,5
Public sector	**0,2**	**0,7**	**0,4**	**0,5**	**0,4**
Transport	**6,1**	**7,1**	**7,3**	**8,3**	**10,0**
Private sector	**1,0**	**1,9**	**1,7**	**1,7**	**1,8**
Energy	**1,2**	**1,9**	**3,6**	**4,1**	**5,1**
Network	0,3	0,6	0,9	1,1	1,4
Production technologies	0,6	0,7	2,2	1,8	2,6
New fuels (hydrogen, synthetic fuels, etc.)	0,0	0,0	0,3	0,8	0,8
Natural gas, Biomass	0,3	0,6	0,2	0,3	0,3

Investment and consumer expenditure on energy efficient equipment asa percentage of GDP will be 12.5 % in 2025 – 2030, up 3.5 % of GDP compared to 2015 – 2020. The increase in investment and consumer spendingis broken down differently by sector. For the period 2025 – 2030, thehousehold share will be 52 % of additional investment and expenditure, the public sector at 2 %, transport at 12 %, the private sector at 8 % and energy at 26 %.

Consumption expenditure on energy efficient equipment as a percentage of incomeis expected to reach 8.2 % in 2030 from 5.7 % in 2020.

Figure 17: Consumption expenditure on energy efficient equipment (% ofincome)



Consumption expenditure on heat pumps, electric cars, energy-efficient electrical appliances is a higher burden on households withlow entrances. The low creditworthiness of low-income householdsand the inability to finance may lead them to 'energy poverty', as delaying these costs lead to high costsof use for heating and moving to the coming years.

Actions to subsidise and facilitate access to finance for low- and medium-income households are particularly important in the coming years. Programmes such as Save 2021, which includes separate incentives to support poor and vulnerable households with a separatebudget of EUR 100 million, need to be strengthened in the future, as the average annual consumption expenditure needed for the 'green transition' forlow-income households is estimated at EUR 4 billion for the period 2025-2030.

4.7 The green transition as a growth opportunity

The green energy transition is essentially an investment programme in all energy production and consumption sectors to substitute fossil fuels. New forms of energy are now almost exclusively capital intensive and are produced in the domestic economy, except for part of the equipment imported. Domestic production of the new form of energy is mainly a substitutefor imported natural products, i.e. oil and gas. Domestic production includes production from RES but also the reduction of energy consumption through investments that improve energy efficiency.

The annual equivalent cost of generating energy from RES is now lower than the production of energy from conventional fuels, of any kind. However, the development ofRES leads to increased costs for networks and storage facilities. Nevertheless, a continuous trend towards falling electricity costs over the medium to end should be expected. Investments in energy efficiency, both in buildings and in industry, are economically advantageous because such investments generally havea long time to recover the cost of capital by reducingthe cost of purchasing new energy products. In so far as there is mass production of batteries and new technology vehicles, andelectrification is economically advantageous compared to conventional vehicles. Green hydro andsynthetic fuels currently have high costs compared to conventional fuels, but their costs are expected to fall significantly over the long term through themechanical maturity of the technologies concerned when they are deployed on a large scale.

In conclusion, the cost of energy services for consumers in all sectors is expected to decrease in the medium to long term. Combined with the growth in domestic activity resulting from the substitution of input energy products and the resulting improvement in the current balance of changes, there is a tendency to benefit the economy, i.e. domestic value added and employment.

However, the cost of capital financing is crucial, given the high growth in investment in all sectors and the capitalisationof new technologies. Maintaining adequate low-cost financing forboth private individuals (saving investments and the purchase of durable goods,how appliances and vehicles) and businesses are the key condition for the green energy transition to have a positive benefit for Gross Domestic Product and employment.

4.8 Existing investment flows and projected investment assumptions of the planned policy measures

Achieving the medium- and long-term national targets through the policy measures in the key energy and climate dimensions, as reflected and analysed above, will mobilise a number of significant investments for eachdevelopment of the country, by enhancing the competitiveness of the economy andengagement. These investments are expected to make a significant contribution both to the national economy and to protect consumers from fluctuations in the prices of energy products, including by strengthening competition in the markets foragriculture. At the same time, the achievement of the objectives set out in this plan is adrastic exercise in budgetary terms. In order to bringthe Greek economy into line with a carbon-neutral and more resilient trajectory, the following guidelines are highlighted:

Thoroughly utilise the current Multiannual Financial Framework 2021-2027 and additional sources of funding at EU level to steer the next funding cycle towards the decarbonisation of the economy and society in an energy transition, avoiding financing investments that are not in line with this objective.

Aligning national public funds with the objectives set out in this plan, integrating criteria related to the objectives of this project in the different funding lines.

Directing direct foreign investments towards the Greek economy of the Member, in line with the objectives of decarbonisation and energy through apathway.

Aligning the financial system with decarbonisation objectives, in line with the directives at European and national level to integrate sustainable finance into the activity of financial institutions.

Immediately explore the usefulness of adjusting tax policy to serve the needs of the green transition and the decarbonisation of the communityin the near future.

Given the crucial role of the Ministry of Finance in the green transition of the Greek economy, as the central body for planning and exercising economicpolicy, as well as the supervisory, regulatory and other bodies involved in thecredit system, a Working Group on Sustainable Finance and the Green Economic Transition was set up in March 2022 (Government Gazette, Series II, No 1313/B). The task of the working group is to developstrategic guidance and to draw up a roadmap for the effectiveintegration of sustainability into economic policy and the financial system. In the context of aligning public economic policy with the ambitious objectives of this draft plan as well as with the European targets for green growth, the Ministry of Finance aims to ensure that the green economy inGreece is a driver for growth and outward orientation and a tool to strengthen the resilience of the Greek economy.

The new programming period 2021-2027 will be a key tool to support the expected investments of this programme, at least in specific categories of investment interventions, on the basis of which, and in terms of analysis of available resources, appropriate financial-programmes should be prioritised and selected.

The main features of the new programming period 2021-2027 are as follows:

I. The existence of enabling conditions (replacing the pre-existing conditionalities of the current period), some of which concern the energy sector. The fulfilment of the enablingconditions adjacent to the programme periodmay cause difficulties in financing theprojects concerned.
II. The increase in the importance of repayable aid (given through financialinstruments) and the trend towards a reduction in grants. The increased use of financial tools will

result in an increase in available resourcesfor the implementation of certain categories of energy projects, due to the leverage and recycling of resources. In addition, it is-possible to combine resources from the Funds with resources from other sources in order to facilitate the financing of projects.

The new ‘Partnership Regional Development Pact 2021-2027’ (‘**NSRF 2021-2027**’)largely reflects the new priorities of the European Commission and Greece’s new development priorities for the coming years. The new NSRF 20212027 was approved by the European Commission on 29 July 2021 and Law 4914/19.03.2022 (Government Gazette, Series II, No 61/A/21.03.2022) lays down the arrangements for the management, control and implementation of development interventions for the 2021-2027 programming period. According to this, a total of EUR 26,2 billion is to be made available to the country for the next 7 years, of which EUR 20,9 billion relates to EU support and EUR 5,3 billion relates to the National Contribution. These resources concern the European Social Fund, the European Regional Development Fund (ERDF), the ConceptFund and European Territorial Cooperation.

The proposal for a regulation on the ERDF and the Cohesion Fund provides that, in countries with a gross national income of less than 75 % of the European Union average, at least 30 % of ERDF resources are allocatedto Policy Objective 264, which relates to energy, climate and environment. In addition, 6 % of ERDF resources will be allocated to sustainable urban development. Also, a significant share of Cohesion Fund resources (37 %) will be directed towards Policy Objective 2.

According to the programming of the new NSRF 2021-2027, the public funds (Community and national) available for Policy Objective 2 are estimated. These resources amount to 8.27bn. EUR 200 000. The activation and inclusion of the programmes is already ongoing with the integrated projects raising EUR 254.94 million in European funding and EUR 337.65 million in public expenditure.

The actions/projects to be financed in the field of energy and climate change are, as a general rule, part of Policy Objective 2, as already mentioned. The specific objectives supported by the ERDF and the Cohesion Fund (mainly circularhousing, sustainable development and RES investments) under this Policy Objective are the following:

[64] “a greener, low-carbon Europe by promoting clean and fair energy transition, green and blue investment, the circular economy, climate adaptation and risk prevention and management.”

I. Promoting energy efficiency measures.

II. Promotion of renewable energy sources.

III. Developing smart energy systems, grids and storage equipment at local level.

IV. Promoting climate change adaptation, risk prevention and disaster resilience.

V. Promoting sustainable water management.

VI. Promoting the transition to a circular economy.

VII. Enhancing biodiversity, green infrastructure in the urban environment and reducing pollution.

Limitations on eligibility result from Article 6 of the draft ERDF and Cohesion Fund Regulation and from the areas of intervention proposed in the draft Common Provisions Regulation for the Funds. In particular, the ERDF and the Cohesion Fund do not support, inter alia, “investments related to the production, processing, distribution, storage or combustion of fossil fuels”. The above limitation, at this stage of the negotiation, excludes investments-relating to (i) the replacement of coal-fired heating systems with natural gas heating systems, (ii) the distribution and transport of natural gas for carbon substitution and (iii) clean vehicles as defined in Article 4 of Directive 2009/33/EC of the European Parliament and of the Council’.

The areas of intervention in the draft Common Provisions Regulation relating to a low-carbon economy are as follows:

- ✓ Energy efficiency and demonstration projects in SMEs and supporting measures.
- ✓ Energy efficiency with renovation of existing housing stock, demonstration projects and supporting measures.
- ✓ Energy efficiency with renovation of public infrastructure, demonstration projects and supporting measures.
- ✓ Support companies specialising in the provision of services contributing to the low-carbon economy and climate resilience.

- ✓ Renewable sourceaction: wind.
- ✓ Renewable sourceaction: solar.
- ✓ Renewable sourceaction: biomass.

- √ Renewable sourceaction: marine (wave, tidal).
- √ Other renewable energy sources (including geothermalenergy).
- √ Smart energy distribution systems at medium and low voltage levels (including smart energy grids and ICT systems) and related storage systems.
- √ High-efficiency cogeneration, district heating and cooling.
- √ Supporting environmentally-friendly production processes and resourceefficiency in SMEs.
- √ Adaptation to climate change measures and prevention and management of climate-related risks: floods (including awareness raising activities, civil protection and disaster management systems and infrastructures).
- √ Adaptation to climate change measures and prevention and management of climate-related risks: fires (including awareness raising activities, civil protection and disaster management systems and infrastructures).
- √ Adaptation to climate change measures and prevention and management of climate-related risks: other risks, e.g.storms and drought (including sensitising activities, civil protection and disaster management systems and infrastructures).
- √ Water management and conservation of water resources (includingriver basin management, specific measures to adapt to keychange, reuse, reduction of leakages).
- √ Household waste management: prevention, minimisation, sorting, chipping-measures.
- √ Household waste management: mechanical biological treatment, heattreatment.
- √ Promoting the use of recycled materials as raw materials.

The above framework shall also finance electricity transmission infrastructure, with a focus on islands' interconnections, in order to facilitate further RESdevelopment, as well as interventions to promote the just transition of lignite-fired areas and promote the circular economy.

In addition, Policy Objective 3[65] promotes, inter alia, investmentsin 'infrastructure for clean urban transport', which may alsoinclude electro-mobility infrastructure in an urban environment.

In addition, under Invest EU's "sustainable infrastructure" policy area set up by the European

[65] "A more connected Europe by enhancing mobility and regionalICT connections"

Commission in order to integrate within its long-term budget (2021-2027) financial envelopes- for loans and guarantees, it is possible to finance also actions/projects related to the energy sector, which are estimated to add significantly tothe leverage of resources.

Funding for actions in the energy sector may also be included in Policy Objective166, through which actions in the energy and climate change sector relating to research and innovation (e.g. actions involvingnew, sophisticated energy storage systems, new materials, etc.), business(e.g. measures for the energy upgrading of small and medium-sized enterprises) and ICT (e.g. incentives for digital businesses in the field of energy data, etc.) can be financed.

In addition to the resources of the 2021-2027 programming period, which are one of the main tools for financing the objectives of the National Energy and Climate Plan, the **NSRF 2014-2020** will also contribute to this end, through which projects are financed towards the transition to anet-zero carbon economy, to which a significant amount of publicspending of EUR 2 billion is allocated. These projects concern actions to save energy and improve energy efficiency in all sectors (residential, public, tertiary, secondary), promotion of thermal RES and electric RES using a chromictool (Infrastructure Fund), as well as interconnections between islands (Cyclades, Crete) for the modernisation and extension of the transmission and distribution network forthermal energy and natural gas. Under the PADM, resources from the current NSRF 2014-2020 are currently implementing projects with a budget of EUR 275 million in the Regional Unitof Kozani/Florina and in the municipality of Megalopoli, amounting to EUR 10 million.

An additional source of funding for the NECP may be the national authoritiesof the **Public Investment Programme** (PIP). With a view to the transformation of the PIP into a National Development Programme (NRP), energy and climate-related actions/projects may be priorities for this programme in the context of the country’s national development objectives and in the light of the principle of complementarity with EU co-funded interventionsand the effectiveness of the policies and commitments undertaken by the country for specific periods of time. Indicatively, payments planned for projects in waste, wastewater, fuel and energy management and pollution reduction for the year 2023 amount to EUR 533.74 million.

Additional resources for actions related to energy and climate change may be drawn in the period 2021-2027 from the Rural DevelopmentProgramme. The reform of the **Common Agricultural Policy (CAP)**, which applies to the2023-2027 period, entered into force on 1 January 2023, paving the way for a moreand greener CAP, which seeks to ensure a sustainable future for European farmers, in line with the ambitions of the European Green Deal, the Farm

66 “A smarter Europe by promoting innovative and smart economicsuccess”

to Fork Strategy and the Biodiversity Strategy. The new approach of the CFP, based on performance and results, is more flexible andtakes into account local conditions and needs, while increasing the EU's sustainability ambitions. It has a total budget of EUR 386,6 billion, divided into two funds (pillars), in this case the European Agricultural Fund for the-Development and Development (EAGF) and the European Agricultural Fund for Rural Development (EAFRD).

The **National Strategic Plan for the new Common Agricultural Policy (CAP) 2023-2027** of Greece, adopted on 21 November 2022, is based on the active managementof the entire territory, based on innovative and sustainable agriculture and forest production. This strategy implements the EU funded CAP instruments through direct aid, sectoral measures and rural development instruments. The Green Architectureof the Plan includes the achievement of three environmental and climate specific objectives (a) contributing to climate change mitigation and adaptation, (b) sound and efficient management of natural resources, and (c) protectinglivelihoods includes the following building blocks: The main contribution to the performance of the above mentioned objectives is the interventions contributing to the increase incarbon storage. The total budget of interventions for the objective of mitigation and adaptation to climate change is estimated at EUR 878.8 million, while for the natural resources management objective the budget for the years 2023-2027 is estimated at EUR 1.4 billion.

Funds from the **Connecting Europe Facility (CEF)** are also being used to finance important energy infrastructure (Projects of Common Interest), which will be used in the next period by broadening eligibility in the energy sector, including in addition to projects of common interest cross-border cooperation in the field of RES generation, as well as smart grid applications.

Tax policy also plays a prominent role in the expected green transition, which should be designed to reflect real costs, address key social and environmental costs by internalising-outgoing effects and influence behavioural change as a key determinantof fair and sustainable competition. In this regard, the roadmap to be developed by the Green Transition Working Group (GTF) Sustainable Finance is expected to highlight the necessity and appropriate ways to adjust tax policy towards the national objectives of the marginalised NECP and the green transition.

In addition to the above financial sources, important new Europeandelivery mechanisms are being used to finance the requirements of decarbonisation andtransition, which are detailed below.

Recovery Resilience Fund – Repower EU

The Recovery and Resilience Fund (RRF) is theEU's largest financial framework to date, designed to reducethe socio-economic impact caused by the COVID-19 health crisis. The EFF is expected to disburse up to EUR 723.8 billion in grants and loans to Member States by 2026. The UDF Regulation entered into force in February 2021, stipulating that each Member State will submit a National Recovery and Resilience Plan (NRRP) identifying the reforms and investments that the Member State undertakes to implement. The National Recovery and Resilience Plan Greece 2.0 was approved on 13 July 2021 by the Economic FinancialAffairs Council of the European Union (Ecofin). Greece 2.0receives 106 investments and 68 reforms, divided into 4 pillars: Green Transition, Digital Transition, Employment – Skills – Social Cohesion, PrivateDependencies and Transformation of the Economy. It brings together EUR 31.16 billion ofwhich EUR 30.5 billion of European funds to be channelled through grants and loans, and is expected to mobilise EUR 60 billion of total investment in the country by the end of 2026, where all projects should have been implemented. The totalfinancial allocation for Greece for Green Pillar grants amounts to EUR 6.2 billion from the Recovery Fund and its duration runs until 2026. For the Recovery Fund loan programme, 500 investment plans have already been submitted for a total of EUR 18,5 billion, with 60 % coming from small andsmall businesses, thus broadening the possibilities and scope of investmentfunding. In particular, for the Green Pillar the total investment loan budget is around 50 % (EUR 9 billion), while the contribution from the UDF is EUR 3.7 billion. Of these, loans amounting to EUR 1.65 billion have already been contracted.

The REPowerEU plan proposed by the EU in 2022 aims to rapidly reduce the European Union's dependence on Russian fossil fuels, with a budget of EUR 20 billion by 2027. To this end, Member States should put adedicated REPowerEU chapter in their National Resilience and RecoveryPlans to identify how to channel investments into the areasidentified as priorities under REPowerEU, such as energy imports, energy savings, fossil fuel substitution and the clean energy transition. This programme will allow Greece to accelerate the implementation ofmeasures aimed at financing energy, private investments in RES, energy efficiency projects, energy storage systems as well as pilot projects for the production of biomethane and renewable hydrogen and the promotion of CCS technologies to promote the decarbonisation of industry.

The proposal for the revision of the National Recovery and Resilience Plan "El2.0" was submitted to the European Commission on 31 August 2023. At the heart of the revision is the new REPowerEU investment and reform package with EUR 795 million of EU funding aimed at Europe's energylaw and the request for additional loans of EUR 5 billion to be added to the-Recovery Fund's ongoing loan programme. The request for additional loans of EUR 5 billion directed to the private economy responds to the high demand of the Recovery Fund loan programme

The revised Recovery and Resilience Plan through REPowerEU provides financial support for energy efficiency actions for households, businesses andthe single and RES energy storage systems. It paves the way forbiomethane and green hydrogen and CO2 capture andstorage technology through pilot projects and reforms shaping the token and operational framework. REPowerEU reforms also include optimising land use for RES deployment, increasing grid and energy storage capacity to promote relevant investments, etc.

Decarbonisation Fund for Islands

In the context of achieving Greece's ambitious targets by 2030 for tacklingclimate change, energy transition and decarbonising islands, the Ministry of the Environment and Energy established, in cooperation with the Directorate-General for Climate (DG Clima) and the European Investment Bank (EIB), the new financing mechanism "Islands Decarbonisation Fund", drawing on the auctioning of 25 million tonnes of unallocated CO2 emission allowances (Ministerial Act EYDEP/YEPRAA 12299/25-10-22). The actions to be financed include changing the energy model in the non-interconnected islands with the mainland electricity transmission-system, as well as faster electricity interconnection, as well as energysaving projects. Part of the funds of the Decarbonisation Fund will be commensurate with the financing of islands' electricity interconnection projects in order to speed up the implementation of ADMIE planning, but also energyprojects. This new financing mechanism is a key tool for achieving the objectives of Article 21 'Transforming the Development Model of Islands and their transition to climate neutrality' of the recently adopted National Climate Law (Law 4936/2022, Government Gazette, Series I, No 105). The amount of funding for the years

2024-2030 to be allocated to the decarbonisation of the islands of June andAgio in Greece from the decarbonisation fund is estimated at EUR 2.27 billion in current prices, with total expenditure estimated at EUR 5.4 billion, also depending on the price of emission allowances in the monetary valuation.

The Just Transition Fund

The Just Transition Mechanism is part of the European Green Deal and aims at a fair and equitable green transition. It will mobilise at least EUR 100 billion of investments over the period 2021-2027 to support workers and citizens in the regions most affected by the transition, with funding from the EU budget, co-financing from Member States, as well as contributions from InvestEU and the European Track ofPedestrian Investment (EIB).

The Just Transition Fund was established in June 2021 as part of the politicalcontext and was included in the Common Provisions Regulation for all individualStructures and Investment Funds. The Just Transition Fund shall support onlydevelopments that serve the purposes of economic diversification of the aboveprovisions, the acquisition of new skills and the active integration of workers andjobseekers. It may also support productive investments of large enterprises,other than SMEs, provided that they have been approved as part of a Territorial Plan and are necessary for its implementation.

In this context, the Just Development Transition Plan for the lignite regions of Western Macedonia and the Municipality of Megalopoli has been drawn up and made public consultation by 10November 2020, with a view to creatingdevelopment opportunities for the regeneration of local security, jobs and the creation of new ones. The total amount of funding, including the obligation to leverage private resources, is estimated to exceed EUR 5 billion frompublic and national resources.

Social climate fund

The Social Climate Fund will support the most vulnerable households, micro-enterprises and public transport users in view of the expected increase in energy and public transport prices following its expansion

ETS in the transport and buildings sector). The implementation of this fund will take place during the years 2026-2032, with Greece having access to around EUR 3.37 billion, submitting a Social Climate Plan containing the measures and investments it intends to implement to mitigate the social impacts caused. This concerns measures and investments aimed at reducing dependence on fossil fuels by increasing energyefficiency of buildings, decarbonising heating and cooling systems and promoting low or even zero-emission mobility solutions.

The Innovation Fund

The Innovation Fund is one of the largest programmes to finance demonstration projects for innovative low-carbon technologies. Funding and projects shall focus on:

· Innovative low-carbon technologies and processes in carbon-intensive industries, including the substitution of carbon-intensive products.

Carbon Capture and Utilisation (CCU).

The construction and maintenance of carbon capture and storage.

Innovative generation of electricity from renewable sources.

Energy storage.

Pure zero mobility (maritime, air, road) and buildings

The revenues of this fund shall be derived from the auctioning of allowances under the ETS. It is estimated that the Innovation Fund could reach up to EUR 38 billion, depending on the carbon price at the time of thenotional valuation of emission allowances[67].

In 2023, the revision of the EU ETS Directive reinforced the Innovation Fund as follows:

- The overall size of the Innovation Fund has increased from 450 million ETS allowances to around 530 millionETS allowances.
- Changes in scope: new sectors (e.g. shipping, aviation).
- Introduction of medium-scale projects;
- Application of the Do No Significant Harm (DNSH) principle since 2025;
- Stronger reference to multiple environmental impacts
- The introduction of new financial instruments (“Competitive Tender”)
- Greater attention to geographical balance, including through technical assistance to Member States with low effective participation.

The Innovation Fund is a key element to achieve the goal of a carbon-neutral Europe by 2050 and to comply with the Paris Agreement.

Modernisation Fund

Following the revision of the EU ETS Directive as part of the Fit for 55 package, Greece will become one of the new Member States that will benefit from this fund to support the modernisation of energy systems and the improvement of energyefficiency in Member States with lower GDP per capita. This will allow the financing of investments in renewable energy, energy efficiency, storage and energy grids and to promote a just transition in territories whose economy was previously based on industrial or other high-carbon activities. In order for this Fund to function, Greece will have to submit investment proposals to the European Investment

The[67] total funding of the Innovation Fund depends on the carbon price and can reach around EUR 40 billion between 2020 and 2030, calculated with a carbon price of EUR 75/tCO_2.

Bank and to aninvestment committee, which will be assessed with a view to disbursing the proceeds of this Fund, which will always be subject to State aid authorisation. As regards the treasurerof the support, Greece will receive 10.1 % of the total value of this fund between 2024 and 2030, corresponding to approximately EUR 19.51 million. Combining the above funding with national programmes, through whichadditional actions are financed (e.g. Ilektra Programme, NationalDevelopment Programme (Law 4635/2019)), which contribute to the transition to a low-carbon economy (energy efficiency, RES, energy infrastructure), as well as the use of market mechanisms (e.g. Green Pool, Bilateral Power Supply Contracts, on-bill financing, Enforcement Schemes, Auctions to save land), will trigger significant resources for the implementation of relevant projects.

Ultimately, at the level of public funding there are currently national resources aimed at supporting the decarbonisation of the economy andthe energy transition, offering some financing possibilities availableto the public and private sectors. The implementation of the updated NECPentails accelerating the action of the funds identified with a focus on the objectives set, coupled with close links between the different sources ofsupply and stimulating the use of European funds.

At the same time, mobilising additional financing from the private sector, including – taking into account the contribution from foreign investors and international financial institutionsto new blended finance and lending mechanisms and models (Green Bonds, green loans), in line with the objectives of sustainable development – a crucial role and is expected to expand significantly.

The identification of the investment gap at the time of finalisation of this draft plan, the design and development of new financingschemes and smooth financial projects and their optimal use through the appropriate leverage of available resources, while mobilising private capital, will lead to investment:

a significantly larger budget than the resources made available through southernand national programmes, making a decisive contribution to the achievement of energy and climate policy objectives.

5.1 General parameters and variables

	2019	2020	2021	2022	2023	2024	2025	2030	2035	2040	2045	2050
Population (000)	10,725	10,697	10,666	10,632	10,595	10,554	10,510	10,303	10,105	9,911	9,714	9,503
Annual rate of change		— 0.30 %	— 0.30 %	— 0.60 %	— 0.40 %	— 0.40 %	— 0.40 %	— 0.40 %	— 0.40 %	— 0.40 %	— 0.40 %	— 0.40 %
GDP (volume in market prices)	186,322	168,170	181,436	185,468	189,586	194,071	194,849	200,430	212,350	231,162	251,168	272,064
Annual rate of change		— 9.70 %	7.90 %	2.20 %	2.20 %	2.40 %	0.40 %	0.60 %	1.20 %	1.70 %	1.70 %	1.60 %

Table 35 Macroeconomic and demographic cases

Annual rates of change	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2040	2045	2050
Agriculture	2.20 %	— 1.80 %	— 5.30 %	1.00 %	1.20 %	1.10 %	0.00 %	— — 0.30 %	— — 0.10 %	0.20 %	0.40 %	0.40 %	0.20 %
Construction	10.20 %	30.50 %	— — 29.60 %	34.90 %	2.30 %	2.20 %	2.30 %	0.20 %	0.40 %	0.90 %	1.10 %	1.70 %	1.80 %
Services	0.20 %	1.20 %	— 8.70 %	7.30 %	2.20 %	2.20 %	2.40 %	0.50 %	0.60 %	1.30 %	1.90 %	1.80 %	1.80 %
Industry Cooperative energy	3.20 %	1.00 %	— — 12.60 %	8.60 %	2.50 %	2.50 %	2.80 %	0.30 %	0.40 %	0.80 %	0.90 %	0.90 %	0.90 %
Energy Sector	5.70 %	1.30 %	— 9.30 %	4.70 %	1.80 %	1.70 %	1.90 %	— — 0.20 %	— — 0.10 %	0.50 %	0.30 %	0.30 %	0.00 %
Basic metals	9.10 %	— 4.80 %	— 9.90 %	3.40 %	1.50 %	1.40 %	1.20 %	— — 0.10 %	0.10 %	0.30 %	0.30 %	0.20 %	0.00 %
Chemicals	3.90 %	0.40 %	— 2.70 %	1.30 %	0.40 %	0.60 %	0.90 %	— — 0.10 %	0.10 %	0.70 %	0.70 %	0.60 %	0.60 %

Non-metallic min-erals	4.80 %	4.70 %	— — 15.90 %	15.90 %	2.30 %	2.30 %	2.40 %	0.40 %	0.50 %	0.90 %	0.90 %	1.20 %	1.30 %
Pulp, paper and printing	— 3.00 %	0.80 %	— — 13.20 %	8.10 %	2.10 %	2.10 %	2.20 %	0.10 %	0.30 %	0.40 %	0.30 %	0.00 %	— 0.10 %
Food, drink and tobacco	0.30 %	2.20 %	— — 17.80 %	15.80 %	4.40 %	4.30 %	5.10 %	0.90 %	0.90 %	1.10 %	1.20 %	1.80 %	2.00 %
Textiles	— 2.70 %	— 0.70 %	— — 26.90 %	15.30 %	1.60 %	1.50 %	1.50 %	— — 0.50 %	— — 0.30 %	— — 0.20 %	— — 0.40 %	— — 1.10 %	— 1.70 %
Engineering	3.30 %	1.90 %	— — 10.20 %	8.00 %	2.40 %	2.40 %	2.60 %	0.40 %	0.40 %	1.10 %	1.90 %	1.20 %	0.90 %
Other industries	1.40 %	0.40 %	— — 15.40 %	8.70 %	2.00 %	2.00 %	2.10 %	0.00 %	0.40 %	0.50 %	0.40 %	0.00 %	0.00 %
Total GVA	0.90 %	1.80 %	— 9.70 %	7.90 %	2.20 %	2.20 %	2.40 %	0.40 %	0.60 %	1.20 %	1.70 %	1.70 %	1.60 %

Table 36 Growth of the economy by industry

Greece	kt or other Volume indicator	2019	2020	2025	2030	2035	2040	2045	2050
Iron and Steel	Electric arc steel (kt)	1253	1323	1339	1372	1345	1376	1366	1356
Non Fer-Rous	Alumina (kt)	917	977	1179	1196	1205	1206	1207	1208
	Primary aluminium (kt)	173	181	189	198	197	198	199	199
	Lead (kt)	28	30	30	31	31	31	31	31
	Ferrro-alloys (kt)	102	105	110	115	115	116	116	116
	Nickel (kt)	17	17	18	18	18	18	18	18
	Secondary aluminum (kt)	351	301	355	379	378	383	383	383
	Other Nonferrous (kt)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Chemicals (AG-gregatre volume indicator)	Fertilisers (vol. INDIC.)	470	473	481	508	514	544	562	576
	Petrochemicals (vol. INDIC.)	205	204	211	218	223	239	249	258
	Other chemicals (vol. INDIC.)	30	30	34	37	39	41	44	47
	LOW energy intensive Chem-icals (value added in constant EUR)	974	967	1032	1089	1170	1267	1319	1377
Paper and Pulp	Paper (kt)	459	472	454	467	460	476	477	477

Non Metallic Minerals	Cement kilns with clinker (kt)	6034	5903	6295	6964	6874	6923	6902	6935
	Glass primary (kt)	72	68	63	63	65	67	67	67
	Glass recycled (kt)	34	30	32	33	35	37	38	39
	Ceramics (vol. ind.)	111	102	115	122	125	130	134	137
	Other Nonmetallic minerals stone Clay etc. (vol. INDIC.)	186	178	190	197	194	205	209	213

Table 37 Production of industrial branches in physical units

EUR '2015/MWh- fuel	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Crude oil	36	48	29	22	51	51	51	54	59	66
Natural gas	20	25	24	11	44	38	38	38	38	40
Coal	9	13	7	5	10	10	10	11	12	12

Table 38 International prices of imported energy products

ETS prices in EUR '2015/tCO2	2010	2015	2020	2025	2030	2035	2040	2045	2050
WEM	11.5	7.5	25	80	80	80	80	120	150
WAM	11.5	7.5	25	80	80	110	235	340	390

Table 39 ETS CO2 emission allowance prices

5.2 Assumptions and projections for the consumption sector; land

	2021	2025	2030	2035	2040	2045	2050
Total final consumption sectors (ktoe)	15608	16597	15392	13743	12734	11974	11497
Buildings in the residential sector	4279	4286	3731	3388	3277	3166	3031
Service sector buildings	2227	2091	2013	1909	1809	1765	1735
Public sector buildings	723	717	685	648	610	595	581
Private and commercial buildings	1504	1373	1328	1261	1199	1170	1154
Agriculture	310	191	163	167	169	169	167
Total industry	2566	3163	3095	2595	2651	2646	2659
Steel	146	136	120	108	95	92	91
Non-ferrous metals	613	869	909	615	706	747	724
Chemical industry	98	201	163	140	134	142	151
Non-metallic minerals	640	723	731	669	738	723	732
Paper	71	83	77	61	47	42	40
Food and drink	463	512	549	462	400	386	416
Equipment industry	95	68	65	51	39	39	38
Textiles	46	49	45	31	31	26	24
Other industry	394	523	436	457	460	447	444
Total sector	6226	6865	6391	5684	4827	4228	3905
Track-based transport	25	44	47	46	45	43	41
Public road transport services	367	371	371	353	300	257	237
Cars and two-wheelers	4412	4731	4132	3346	2519	1917	1551
Coastal shipping	575	520	575	565	545	540	506
Air transport	848	1199	1267	1373	1418	1471	1569

Table 40 Energy consumption by final consumption sector

	2021	2025	2030	2035	2040	2045	2050
Industry (value-added energy)	209	194	185	149	144	136	130
Economic sector (energy in terms of income)	36	32	28	24	21	19	17
Service sector (energy in terms of value added)	14	15	14	13	11	10	9
Transport Sector Freight transport (inlandin terms of tonne-kilometres)	42	38	34	31	27	24	21
Passenger transport (energy in terms of passenger-kilometres)	31	28	23	19	16	13	12

Table 41 Energy intensity indicators (% change since 2005)

	2021	2025	2030	2050
Energy upgrading of the building envelope				
Buildings in the residential sector (thousand buildings)				
Number of oldbuildings upgraded annually	47	59	79	83
Number of old buildings without energy upgrading remaining at the end of the period	3620	3212	2715	1256
Service sector buildings (thousand buildings)				
Number of oldbuildings upgraded annually	1	1	1	2
Number of old buildings without energy upgrading remaining at the end of the period	194	184	177	135
Energy efficiency of appliances				
Improving the energy efficiency of appliances since 2015 (= 100)				
Heat pumps	111	137	140	160
Boilers	102	125	131	141
Lighting	113	135	138	139
Electrical appliances	111	122	127	129
Average residential energy consumption per square metre (kWh/m²)	135	128	112	90

Table 42 Energy efficiency indicators in the building sector

Energy efficiency target

Following the formula for calculating the national contributions to the Union's 2030 energyefficiency targets in final energy consumption and/or primary energy consumption, as set out in Annex I to Directive (EU) 2023/1791, it appears that the level of Greece's national ambition for final and primary energy consumption should be -7.9 %. Both shallcorrespond to the level of ambition before the application of the primary and final energy tollfactor *(C_{EU})*, calculated by the Commission,shall be identical for all members and shall be applied to adjust theeffect of the formula for all national contributions to the respective Union targets. With an estimate of the correction factor, the level of Greece's national ambition should be -10.6 % and – 10.7 % for final and primary energy consumption respectively.

The following steps are taken on how to calculate.

1. The level of national contributions is calculated based on the indicative formula:

FEC_{Camo} = (^ (1 – Target)

$PEC_{t\ AHW}$ = 0 ^ (1 – Target) PEC

Where CEU is a correction factor. Target the level of national ambition and $FEC_{B2}OIO$ PEC B2O1O the 2020 EU Reference Scenario used as the baseline for 2030.

2. The following indicative formula represents the objective criteria reflecting the factors listed in Article 4(3)(d) (iv) to (iv), each used to determine the level of national ambition in % (Target) and has the same weight in the formula (0,25):

(a) contribution dependent on early action

(b) contribution based on GDP per capita (“F AHH”);

(c) a contribution dependent on energy intensity (‘F y’);

(D) contribution depending on the cost-effective energy saving potential (“F-, j”).

3. The coefficient calculated for each Member State as the product of the amount of energy savings that it achieves the improvement of energy intensity achieved by each Member State. Theamount of energy savings for each Member State shall be calculated on the basis of the reduction of energy consumption (in toe) to the Union’s reduction of energy consumption between the three-year average for the period 2007-2009 and the three-year average for the period 2017-2019. Theimprovement in the energy intensity for each Member State shall be calculated on the basis of the reduction of energy intensity (in toe/EUR) to the Union’s reduction of energy intensity between the three-year average for the period 2007-2009 and the three-year average for the period 2017-2019.

4. Calculated for each Member State on the basis of the three-year average ofEurostat’s realGDP per capita index to the Union’sthree-year average over the period 2017-2019, expressed inpurchasing power parities (PPPs).

5. F $falemily_{is}$ calculated for each Member State on thebasis of the three-year average of the final energy intensityindex (FEC or PEC per real GDP in PPP) and the Union’sthree-year average for the period 2017-2019.

6. Fp, ‘$_{ia}$i’ is calculated for each Member State based on final or primary energy savings under the PRIMES MIX 55 %scenario for 2010. The savings are expressed in relation to 2020 EU Reference Scenario projections for 2010.

7. **Forany criterion set out in points 2 (a) to (8), a lower and upper limit shall apply. The level of ambition for F factors ‘i_th. $F_{in,cmily}$ and P,‘shall be limited to 50 % and 1 50 % of the Union average level of ambition based on a given factor. The level of ambition for the coefficient shall be limited to 50 % and 100 % of the Union average level of ambition**

8. **The source of the input data used to calculate the factors is Eurostat unless stated otherwise.**

9. F $11M1_l$ is calculated as the weighted sum of allfour factors (F Hy F ‘ITB > FimouKy and FPU). TheTarget isthen calculated as the productof the total factor F_{total} multiplied by the Union target.

10. The Commission shall calculate aprimary and finalenergy correction factor $_{of}$CtlJ, which shall be applied to adjust the sumof the formula results for all national contributions to the respective Union targets in 2030. TheC_{EV} factor is identical for all Member States.

Figure 11 Steps of Energy Efficiency Target Calculation Steps

	Final energy consumption											
	Initial figures						**Final figures (after application of limits)**					
	Fearly-action1	**Fearly-action2**	**Fearly-action**	**Wealth**	**Finten- sity**	**Fpo-tential**	**Fearly-action1**	**Fearly-ac- tion2**	**Fearly-action**	**Wealth**	**Finten-sity**	**Fpo-tential**
GR	31.6 %	31.5 %	10.0 %	66.3 %	105.5 %	— 7.8 %			50.0 %	66.3 %	105.5 %	50.0 %

EU — 11.69 %

CEU 0.97

Ftotal	Target
68.0 %	0.0 %

ktoe

Calculated FEC_C2030	FECB_2030
16235	16235

After correction CEU

Calculated FEC_C2030	Calculated Target
0	— 100.0 %

	Primary energy consumption											
	Initial figures						**Final figures (after application of limits)**					
	Fearly-action1	**Fearly-action2**	**Fearly-action**	**Wealth**	**Finten- sity**	**Fpoten-tial**	**Fearly-action1**	**Fearly-ac- tion2**	**Fearly-action**	**Wealth**	**Finten-sity**	**Fpo-tential**
GR	9.0 %	28.8 %	2.6 %	66.3 %	104.4 %	— 4.5 %			50.0 %	66.3 %	104.4 %	50.0 %

EU — 11.70 %

CEU 0.97

Ftotal	Target
67.7 %	0.0 %

ktoe

Calculated FEC_C2030	FECB_2030
18788	18788

After correction CEU

Calculated FEC_C2030	Calculated Target
0	— 100.0 %

5.3 Assumptions in the electricity sector

	2021	2025	2030	2035	2040	2045	2050
Total final consumption sectors (ktoe)	4233	4593	4905	5443	5953	6222	6453
Buildings in the residential sector	1524	1641	1740	1801	1847	1881	1840
Service sector buildings	1423	1664	1708	1836	1888	1896	1937
Public sector buildings	441	424	426	440	445	446	451
Private and commercialbuildings	982	1239	1283	1396	1443	1450	1486
Agriculture	224	145	124	129	132	133	134
Total industry	1046	1102	1154	1263	1423	1490	1519
Steel	97	94	88	87	79	78	77
Non-ferrous metals	325	394	424	326	364	406	403
Chemical industry	42	60	62	90	87	96	103
Non-metallic minerals	104	87	90	123	195	203	213
Paper	37	43	41	38	35	35	34
Food and drink	159	151	170	189	188	202	223
Equipment industry	57	28	27	27	29	32	32
Textiles	21	27	26	19	21	20	18
Other industry	205	219	226	364	425	418	417
Total sector	16	41	179	415	663	821	1022
Track-based transport	14	25	29	31	32	34	36
Public road transport services	0	1	18	32	47	61	71
Cars and two-wheelers	2	15	126	331	547	670	832
Coastal shipping	0	1	3	9	13	22	42

Table 43 Evolution of electricity demand in total and by consumption category

	2021	2025	2030	2050
Buildings sector				
Residential buildings with heat pump for heating (thousand buildings)	351.3	519.3	856.6	2727.4
% of new residential buildings with heat pumps for heating	9 %	65 %	84 %	91 %
Electricity demand from heat pumps for heating and cooling (kg tip)	67.0	92.4	116.4	200.3

Buildings in the heating heat pump services sector (thousand buildings)	109.0	138.5	150.6	191.3
% of new service buildings with heat pumps for heating	42 %	83 %	91 %	91 %
Electricity demand from heat pumps for heating and cooling (thousand. toe)	246.7	297.0	273.6	401.5
Transport Sector				
Electric vehicle fleet (thousand vehicles)				
public road transport	0.0	0.1	3.2	16.2
in cars and two-wheelers	3.8	79.0	917.3	6396.8
% electric vehicles in new sales				
public road transport	0.0 %	2.0 %	26.1 %	42.2 %
in cars and two-wheelers	0.0 %	6.8 %	32.7 %	88.4 %
Electricity demand (thousand tip)	1.2	10.5	128.7	826.0
public road transport	0.4	0.8	17.8	71.0
in cars and two-wheelers	0.9	9.7	111.0	755.0

Table 44 Electricity penetration indicators in the final consumption sectors

NECP	2025	2030	2035	2040	2045	2050
RES-Electroproduction Index						
Total RES generation (TWh)	35	53	76	111	148	172
Total generation (TWh)	59	65	79	112	149	175
Electricity sector						
RES power other than hydroelectric (GW)	15	24	35	46	64	72
Wind	6	10	15	19	27	29
— of which sea	0	2	6	10	15	17
Solar	8	13	19	25	35	40
Other RES	1	1	1	2	2	2
Hydroelectric	3	4	4	4	4	4
Electricity storage power(GW)	3	5	6	11	21	25
— batteries (GW)	2	3	4	9	19	23
— pumped storage	1	2	2	2	2	2
Capacity of gas-fuelled units (GW)	7	8	6	5	3	4
Power of solid fuel units (GW)	2	0	0	0	0	0
Power of Liquid Fuel Units (GW)	1	1	1	0	0	0
Total electricity generation(TWh)	59	65	79	112	149	175

— from gaseous fuels (Twh)	16	12	2	1	2	3
— of solid fuels (Twh)	5	0	0	0	0	0
— from liquid fuels (Twh)	2	0	1	0	0	0
— from RES (Twh)	35	53	76	111	148	172

Table 45 NECP targets in the electricity sector

	2025	2030	2035	2040	2045	2050
Demand	61	67	81	115	153	178
Final Energy Consumption	53	57	63	68	72	76
Transit and distribution losses	5	5	6	6	6	5
Power for Hydrogen and clean fuels	0	3	11	39	72	92
Pumping Losses	0	1	1	2	3	4
Own consumption	0	0	0	0	0	0
Refineries Without Other uses	1	1	1	0	0	0
Supply	61	67	81	115	153	178
Total electricity generation(TWh)	59	65	79	112	149	175
— from gaseous fuels (Twh)	16	12	2	1	2	3
— of solid fuels (Twh)	5	0	0	0	0	0
— from liquid fuels (Twh)	2	0	1	0	0	0
— from RES (Twh)	35	53	76	111	148	172
Wind	15	25	37	53	77	88
— of which sea	0	6	18	31	49	58
Solar	12	19	25	36	49	60
Other RES	2	2	7	14	14	16
Hydroelectric	6	7	7	8	7	7
Net Imports	2	2	3	3	4	3

	2030	2035	2040	2045	2050
Wind Park Power (GW)	1.9	4.3	3.6	5.6	1.9
Capital Expenditure (MEUR)	4054.8	9512.4	8103.0	12517.4	4263.1

Table 46 Capital costs for the development of LAGs

NECP (Apr 2023)	2021	Central scenario					
		2025	2030	2035	2040	2045	2050
Total net imports (importedgoods – exports) (thousand tip)	17216	16963	14044	9835	6808	3482	2279
— of solid fuels (thousand tips)	164	216	200	87	28	6	3
— of liquid fuels (thousand tips)	11170	11978	10006	7061	4102	2259	864
— from gaseous fuels (thousand tips)	5416	4088	3174	1657	1400	606	671
— from RES (thousand tip)	149	525	473	847	1089	1714	1624
— of green hydrogen (thousand tip)	0	0	— 9	— 43	— 93	— 1451	— 1119
— of electricity (thousand tips)	317	157	199	226	281	348	236
Energy dependency ratio (%)	74 %	74 %	66 %	47 %	30 %	15 %	9 %

Table 47 Net energy imports

5.4 Decarbonisation assumptions in the transportsector

	2021			2030			2050		
000 toe	Land	Aerial	Chambers *	Land	Aerial	Chambers * *	Land	Aerial	Chambers *
Fossil fuels/natural gas	4,572	999	2,385	3,956	1,203	2,395	23	109	149
Biofuels/biomethane	216	— —	— —	426	63	215	139	548	1,299
Synthetic fuels/gas	— —	— —	— —	— —	— —	0	288	899	1,164
Electricity	16	— —	— —	137	— —	64	875	13	117
Hydrogen	— —	— —	— —	30	— —	0	541	— —	66

*** Includes coastal andinland shipping**

Table 48 Energy consumption in transport by sector and type of fuel

000 toe	2030				
	Cars	Two-wheel	Public transport	Light trucks (3.5 tonnes)	Heavy lorries (> 3.5 tonnes)
Fossil fuels/natural gas	1952	189	303	784	701
Biofuels/biomethane	168	12	41	109	93
Synthetic fuels/gas	0	0	0	0	0
Electricity	100	0	13	1	6
Hydrogen	2	0	14	0	13

Table 49 Energy consumption in road transport by sector and typeof kitchen for 2030

	2030				
	Cars	Two-wheel	Public transport	Light trucks (3.5 tonnes)	Heavy lorries (> 3.5 tonnes)
Conventional	81 %	99 %	86 %	99 %	97 %
Electric	19 %	1 %	9 %	1 %	2 %
Hydrogen cell	0 %	0 %	5 %	0 %	1 %

Table 50 % of vehicle technologies over the total fleet in road transport by industry in 2030

	2021				2030			
	Road	Railways	Aviation	Chambers**	Road	Railways	Aviation	Chambers**
Overall energy consumption (000 tip)	4,782	22	999	2,385	4,503	47	1,267	2,675
Minerals fuel/natural gas	4,565	7	999	2,385	3,930	27	1,203	2,395
Biofuels/biomethane	216	— —	— —	— —	423	4	63	215
Synthetic fuels/gas	— —	— —	— —	— —	— —	— —	— —	0
Electricity	1	15	— —	— —	121	16	— —	64
Hydrogen	— —	— —	— —	— —	30	0	— —	0
CO2 emissions *	14,242	23	3,138	8,350	11,740	83	3,599	7,618

Table 51 Energy consumption in the transport sector in 2030

	2035				2040			
	Road	Railway or tramwayrails	Aviation	Chambers* *	Road	Railway or tramway-	Aviation	Chambers- * *
Minerals fuel/natural gas	2,387	18	1,030	2,138	1,002	9	709	1,724
Biofuels/biomethane	478	5	206	329	502	7	340	569
Synthetic fuels/gas	460	4	137	139	584	7	369	338
Electricity	312	19	— —	73	516	21	— —	84
Hydrogen	63	1	— —	4	226	1	— —	7
CO2 emissions *	7,114	56	3,080	6,796	2,944	28	2,120	5,471

Table 52 Energy consumption in the transport sector in 2035-2040

	2045				2050			
	Road	Railway or tramway-	Aviation	Chambers* *	Road	Railway or tramwayrails	Aviation	Chambers* *
Fossil fuels/natural gas	295	4	585	776	23	0	109	149
Biofuels/biomethane	347	7	399	1,201	134	5	548	1,299
Synthetic fuels/gas	454	7	486	656	279	9	899	1,164
Electricity	741	23	1	98	850	25	13	117
Hydrogen	394	1	— —	28	539	2	— —	66
CO2 emissions *	856	11	1,750	2,473	61	— —	326	486

Table 53 Energy consumption in the transport sector in 2045-2050

5.5 Assumptions for the budgetary impact assessment

Excise TAX (excluding carbon tax in EUR/toe)											
	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Diesel oil											
Power generation	0.0	158.3	282.2	238.5	318.6	0.0	318.6	318.6	318.6	318.6	318.6
Industry	0.0	164.9	364.8	238.5	318.6	318.6	318.6	318.6	318.6	318.6	318.6
Households	0.0	28.3	520.7	239.0	288.8	288.8	288.8	288.8	288.8	288.8	288.8
Services	0.0	28.3	497.0	116.4	145.3	145.3	145.3	145.3	145.3	145.3	145.3
Agriculture	0.0	14.1	497.0	307.2	458.3	458.3	458.3	458.3	458.3	458.3	458.3
Transport private	0.0	316.6	474.3	384.0	458.3	443.2	445.0	378.8	334.6	302.3	272.6
Transport public	0.0	316.6	474.3	384.0	458.3	443.2	445.0	378.8	334.6	302.3	272.6
Rail	0.0	316.6	474.3	384.0	458.3	443.1	445.0	378.8	334.6	302.3	272.6
Navigation	0.0	0.0	0.0	0.0	0.0	36.3	36.5	31.1	27.4	24.8	22.4
Gasoline											
Transport private	0.0	410.9	802.9	829.5	832.5	822.5	822.8	741.2	678.9	643.1	581.0
Transport public	0.0	410.9	802.9	829.5	832.5	822.5	822.8	741.2	678.9	643.1	581.0
Navigation	0.0	0.0	0.0	0.0	0.0	37.1	37.2	33.5	30.6	29.0	26.2
Fuel oil											
Power generation	0.0	19.5	18.6	19.2	18.5	20.6	39.2	39.2	0.0	0.0	0.0
Industry	0.0	23.6	22.3	40.8	39.2	39.2	39.2	39.2	39.2	39.2	39.2
LPG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry	0.0	0.3	40.0	107.2	103.0	103.0	103.0	103.0	103.0	103.0	103.0
Households	0.0	13.4	12.7	53.7	51.6	51.6	51.6	51.6	51.6	51.6	51.6

Excise TAX (excluding carbon tax in EUR/toe)										
Services	0.0	13.4	12.7	53.6	51.5	51.5	51.5	51.5	51.5	51.5	51.5
Agriculture	0.0	13.4	12.7	53.6	51.5	51.5	51.5	51.5	51.5	51.5	51.5
Transport private	0.0	99.2	116.8	295.2	369.8	369.8	404.1	448.9	448.9	448.9	448.9