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Assessment of the final national energy and climate plan of Portugal

Table of contents

1. SUMMARY	2
2. FINALISATION OF THE PLAN AND CONSIDERATION OF COMMISSION RECOMMENDATIONS.....	4
Preparation and submission of the final plan	4
Consideration of Commission recommendations.....	4
3. ASSESSMENT OF THE AMBITION OF OBJECTIVES, TARGETS AND CONTRIBUTIONS AND OF THE IMPACT OF SUPPORTING POLICIES AND MEASURES.....	7
Decarbonisation.....	7
Greenhouse gas emissions and removals	7
Renewable energy	8
Energy efficiency	9
Energy security.....	10
Internal energy market	11
Research, innovation and competitiveness.....	11
4. COHERENCE, POLICY INTERACTIONS AND INVESTMENTS	12
5. GUIDANCE ON THE IMPLEMENTATION OF THE NATIONAL ENERGY AND CLIMATE PLAN AND THE LINK TO THE RECOVERY FROM THE COVID-19 CRISIS.....	14
Link to the recovery from the COVID-19 crisis	16
ANNEX I: POTENTIAL FUNDING FROM EU SOURCES TO PORTUGAL, 2021- 2027	18
Table 1: EU funds available, 2021-2027: commitments, EUR billion.....	18
Table 2: EU funds available to all Member States, 2021-2027, EUR billion.....	18
ANNEX II – DETAILED ASSESSMENT OF HOW COMMISSION RECOMMENDATIONS HAVE BEEN ADDRESSED.....	20

1. SUMMARY

Portugal's final integrated national energy and climate plan (NECP)¹ sets a target for **greenhouse gas (GHG) emissions** not covered by the EU emissions trading system (non-ETS) of -17 % compared to 2005. This is in line with the target set in the Effort-Sharing Regulation (ESR)². With a continuation of current policies, Portugal is expected to meet this target with a large margin of 23%. As part of its objective of achieving carbon neutrality by 2050, Portugal plans a total GHG emission reduction compared to 2005 of -45% to -55% in 2030. It also plans further measures in the building, transport and agriculture sectors. There is less clarity on how the no-debit commitment (i.e. accounted emissions do not exceed accounted removals) for land use, land use change and forestry (LULUCF)³ will be achieved, although some measures are described. If cost-efficient domestic overachievements of the non-ETS targets are used for possible transfers to other Member States, jobs and growth will benefit from it.

Portugal's **renewable energy** contribution to the EU level 2030 target is 47% of gross final energy consumption in 2030. This contribution is sufficiently ambitious, as it is above the 42% resulting from the formula in Annex II of the Governance Regulation⁴. The plan indicates several additional policies and measures to achieve the underlying goals, although many remain generic and difficult to assess.

For **energy efficiency**, the contribution to the EU-level 2030 target is of modest ambition⁵ and amounts to 21.5 Million Tonnes of Oil Equivalent (Mtoe) of primary energy consumption, translating into 14.9 of final energy consumption. Instead of pre-determined absolute consumption levels by 2030, the NECP presents a range of 15.6-21.5 Mtoe for primary energy and 14.4-14.9 Mtoe for final energy consumption. The targets will be achieved through adoption of alternative measures under Article 7 of the Energy Efficiency Directive, taking into account the objective of achieving annual energy savings in final consumption of 0.8% up to 2030. Portugal describes the integration of the Energy Efficiency first principle as one of its priorities in terms of decarbonisation. Portugal provides limited elements on energy efficiency of buildings. It has not yet submitted its long-term renovation strategy.

In terms of **energy security** and **internal market objectives**, Portugal has notably set the objective of reducing energy import dependency to 65% by 2030, which is quite ambitious, given that at present it is 79%. However, this level of ambition is realistic given the envisaged significant deployment of renewable energy and sector integration potential. The planned **interconnection** level by 2030 is 15% (10% in 2020), with a focus on implementing key

¹ The Commission publishes this country-specific assessment alongside the 2020 Report on the State of the Energy Union (COM(2020)950) pursuant to Article 13 of Regulation (EU) 2018/1999 on Governance of the Energy Union and Climate Action.

² Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013.

³ Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU.

⁴ The Commission's recommendations with regard to the Member States' renewable ambitions are based on a formula set out in this Regulation. This formula is based on objective criteria.

⁵ In accordance with the methodology, as illustrated in the SWD(2019) 212 final.

infrastructure projects, notably projects of common interest and several grid reinforcement projects to accommodate further renewables capacity.

Portugal has set a target to invest 1.8% of its GDP in **research and innovation** by 2020 and 3% by 2030. It has also established sub-targets for energy R&D investments of 0.2% of GDP, and water and climate R&D investments of 0.2% of GDP by 2030.

The plan clearly identifies **investment needs** per sector (electricity, transport, buildings, industry and other) until 2040-2050. The overall additional investments required for the decade 2021-2030 to achieve carbon neutrality by 2050 are estimated at EUR 11-15 billion (1 billion per year). There is limited information about how in the policies and measures the investments will be allocated and articulated with the national investment plan⁶. Portugal expects to continue to make use of relevant EU funds to finance the transition and plans to complement these with private investment.

Portugal has included a detailed list of **energy subsidies for fossil fuels** and a detailed list of actions undertaken and planned to phase them out. In general, the overview of fossil fuel tax incentives mentioned in the plan is in line with recent Commission analyses on energy subsidies. More categories of fossil fuel subsidies have been identified in this report. Actions and plans to phase out fossil fuel energy subsidies have been included in the plan.

The plan provides broad information on the **interactions with air quality and air emissions policy**. The energy transition and implementation of the carbon neutrality objective are expected to bring benefits to air quality according to the plan. The NECP indicates that further air-related measures will have to be developed.




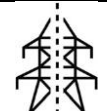
The final plan considers some of the **just and fair transition** aspects and provides information on the social, employment and skills impacts of a transition to a climate neutral economy, such as for example employment and skills in green and energy intensive sectors. The plan provides neither an assessment of the number of households in **energy poverty** nor an indicative objective for its reduction. The plan includes only reference to a long-term strategy to be developed next year.

There are several examples of **good practices** in the Portuguese final NECP, in particular the adequate and coherent alignment of national climate and energy objectives for 2030 (and 2040) with the carbon neutrality target for 2050. Similarly, the plan clearly presents the interaction between climate and circular economy objectives including with an attempt of quantification of the GHG emissions reduction of the circular economy.

The following table presents an overview of Portugal's objectives, targets and contributions under the Governance Regulation⁷:

⁶ <https://www.portugal2030.pt/sobre-pni2030/>.

⁷ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

	National targets and contributions	Latest available data	2020	2030	Assessment of 2030 ambition level
	Binding target for greenhouse gas emissions compared to 2005 under the Effort-Sharing Regulation (ESR) (%)	-16%	1%	-17%	As in ESR, total GHG target implies higher reductions
	National target/contribution for renewable energy: Share of energy from renewable sources in gross final consumption of energy (%)	30.3%	31%	47%	Sufficiently Ambitious (42 % is the result of RES formula)
	National contribution for energy efficiency: Primary energy consumption (Mtoe) Final energy consumption (Mtoe)	22.66 (2018)	22.5	21.5	Modest
	Level of electricity interconnectivity (%)	8.0%	10%	15%	N/A

Sources: European Commission, Energy statistics, Energy datasheets: EU countries; European Semester by country; Portugal's final national energy and climate plan.

2. FINALISATION OF THE PLAN AND CONSIDERATION OF COMMISSION RECOMMENDATIONS

Preparation and submission of the final plan

Portugal **notified** the European Commission of its final NECP on 31 December 2019.

Several presentations and thematic workshops with a broad array of stakeholders took place to discuss the main areas covered by the NECP. A **public consultation** on the NECP followed between between 7 May and 5 June 2019. Although the plan states that the NECP builds on the results of the consultation process, it does not provide a summary of the public views from the consultations. Finally, Portugal has carried out a strategic environmental assessment (SEA) on the NECP under Directive 2001/42/EC.

Consideration of Commission recommendations

In June 2019 the Commission issued 9 recommendations for Portugal's final plan⁸. Annex II to this staff working document offers a detailed account of how different elements of the Commission recommendations have been reflected in the final NECP. Overall, the final NECP **largely addresses** most Commission recommendations. The main changes introduced in the final plan are the following:

⁸ Commission Recommendation of 18 June 2019 on the draft integrated National Energy and Climate Plan of Portugal covering the period 2021-2030, C/2019/4422.

On **GHG emissions**, Portugal **partially addressed** the recommendation to provide quantifiable information on policies and measures for different dimensions (WEM and WAM) to support results. The final plan provides information on policies and measures, but annual projections for 2021-2030 are not provided. It is also not explained whether Portugal intends to use cost-efficient overachievements for possible transfers to other Member States.

On **renewables**, Portugal **largely addressed** the recommendation to detail the policies and measures underpinning Portugal's contribution of 47% renewable energy share by 2030. The NECP provides significant additional information on the policies and measures to achieve the underlying objectives, particularly for the electricity sector. However, the information on the quantification of policies is missing.

On **energy efficiency**, Portugal **largely addressed** the recommendation to significantly increase its ambition for final energy consumption, which is now set at a 35% reduction in energy consumption in 2030 compared to the 2007 PRIMES Reference Scenario projections. In addition, Portugal also addressed the recommendation to identify additional policies and measures that could deliver further energy savings by 2030. The NECP presents a large array of new policies and measures for all sectors, although the quantification of those measures is lacking.

Related to the **internal energy market**, Portugal **partially addressed** the recommendation to set clear objectives, milestones and timelines. In particular, the final plan better outlines the reform of the electricity market. Still, it lacks specific targets and instruments to improve market integration and system flexibility (demand response, storage and distributed generation) and to develop more competitive electricity and gas markets.

On **research, innovation and competitiveness**, Portugal **largely addressed** the recommendation to clarify the national objectives and funding targets. The final NECP now includes specific relevant targets for investment in research and innovation related to energy and climate objectives.

On **regional cooperation**, Portugal **largely addressed** the recommendation to intensify the good existing regional cooperation and consider extending this to renewables and energy efficiency. Regional cooperation was intensified for interconnectors but not for renewables and energy efficiency.

On **investment needs** and mechanisms and funding sources to lever them, Portugal **largely addressed** the recommendation to provide a general overview of the investments needed and the national and European funding sources available to reach its energy and climate objectives and modernise its economy. In particular, the plan provides a wealth of information on the investment needs related to decarbonisation across sectors, although it does not give details about the methodology to arrive at the projected needs and does not consider regional budgets and the possible use of transfers of annual emission allocations to other Member States under the ESR as funding sources.

Portugal **largely addressed** the recommendation to list actions undertaken and plans to **phase out energy subsidies, in particular for fossil fuels**. The plan includes a comprehensive overview of fossil fuel tax exemptions. Portugal states its intention in the plan to eliminate subsidies detrimental to the environment and included actions to achieve this.

Portugal **partially addressed** the recommendation to complement **analysis on the interactions with air quality**. In particular, the final plan provides some broad quantitative estimates of

impacts of the carbon neutrality scenario on NEC-regulated air pollutants and a brief qualitative description of impacts of general climate and energy measures on air pollutants.

Finally, Portugal has **partially addressed** the recommendation to better integrate **just and fair transition aspects**. The final NECP includes a general assessment in the green and energy intensive sectors, but more detailed assessment on skills and employment impacts could be provided. **Energy poverty** has not been quantified; instead the plan announces a forthcoming strategy which will provide a state of play, develop indicators and monitoring strategies, set energy poverty reduction goals (medium and long term) at national, regional and local level, and propose specific measures and forms of financing.

Links with the European Semester

In the context of the European Semester framework for the coordination of economic policies across the EU and of the country report 2019⁹, Portugal received one country-specific recommendation¹⁰ on climate and energy, calling on it to ‘focus investment-related economic policy on research and innovation, railway transport and port infrastructure, low carbon and energy transition and extending energy interconnections, taking into account regional disparities’. In the 2020 country report¹¹ adopted on 20 February 2020, the Commission found that Portugal had achieved some progress on this recommendation.

Due to the COVID-19 crisis, the European Semester country-specific recommendations for 2020 addressed Member States’ responses to the pandemic and made recommendations to foster economic recovery. In particular, they focused on the need to start mature public investment projects as soon as possible and promote private investment, including through relevant reforms, notably in the digital and green sectors. In this context, Portugal received a country-specific recommendation¹² stressing the importance of focusing investment on ‘the green and digital transition, in particular on clean and efficient production and use of energy, rail infrastructure and innovation’.

The Governance Regulation requires Member States to ensure that their national energy and climate plans take into consideration the latest country-specific recommendations issued in the context of the European Semester. In turn, Portugal’s national energy and climate plan has the potential to support the implementation of the European Semester recommendations, as it identifies the necessary reforms, investments and financial sources to meet them.

⁹ The Annex D to the 2019 Country report also sets out priority investments for the 2021-2027 cohesion policy, substantially contributing to the clean energy transition.

¹⁰ Recommendation for a Council Recommendation on the 2019 National Reform Programme of Portugal and delivering a Council opinion on the 2019 Stability Programme of Portugal, COM(2019) 522 final.

¹¹ Commission Staff Working Document Country Report Portugal 2020, SWD/2020/521 Final.

¹² Recommendation for a Council Recommendation on the 2020 National Reform Programme of Portugal and delivering a Council opinion on the 2020 Stability Programme of Portugal, COM(2020) 522 final.

3. ASSESSMENT OF THE AMBITION OF OBJECTIVES, TARGETS AND CONTRIBUTIONS AND OF THE IMPACT OF SUPPORTING POLICIES AND MEASURES

Decarbonisation

Greenhouse gas emissions and removals

The final plan mentions the **effort sharing regulation** (ESR)¹³ target of -17% emissions by 2030 compared to 2005. Portugal's long-term objective is to reduce emissions in effort sharing sectors by 85-90% by 2050 compared to 2005, according to the 2050 roadmap for carbon neutrality. Limited information is provided on the **LULUCF commitment** under the LULUCF Regulation¹⁴ which states that accounted emissions must not exceed accounted removals over the period 2021 to 2030. Portugal does not intend to use the LULUCF flexibility mechanisms: the plan states that the forest reference level (FRL) is not yet quantifiable, and accounted LULUCF projections are not provided.

The projected level of 2030 ESR emissions with existing measures is lower than the target (29.3 Mt compared to 41 Mt CO₂), which corresponds to a reduction of 40%. Assuming that the LULUCF commitment is met, Portugal could overachieve its 2030 ESR target by 23 percentage points. As only an estimate of average annual emission allocations and no annual projections are provided, no clear estimate can be made for the extent of overachievement over the whole period 2021-2030. The plan does not explain whether Portugal intends to use cost-efficient overachievements for possible transfers to other Member States.

The plan includes national economy-wide emission reduction targets consistent with Portugal's commitment to achieve carbon neutrality in 2050 (RNC2050). The ambition targets for total GHG reduction compared to 2005 range between -45% and -55% in 2030 and between -65% and -75% in 2040. However these national targets exclude the LULUCF sector. The lower bound 2030 target is met under the scenario with existing measures (WEM), while the higher bound is only met in the scenario with additional measures.

Portugal has set sectoral targets for the main effort-sharing sectors. The national targets compared to 2005 are: services: -65% (2020), -70% (2030); residential: -14% (2020), -35% (2030); transport: -14% (2020), -40% (2030); agriculture: -8% (2020), -11% (2030); waste: -14% (2020), -30% (2030). Based on the information provided in the plan, it is estimated that the sectoral national targets are partially met with the existing measures scenario. While the targets for waste and transport are both met for 2020 and 2030, for services, residential and agriculture the national targets are not met for both years.

Policies and measures in the **transport sector** aim to achieve significant GHG emission reductions. The NECP provides a broad overview of measures to support electromobility, e.g. full exemption from the registration tax and from the annual circulation tax for electric vehicles, financial support for electric mobility and for the purchase of vehicles producing less emissions in public transport fleets as well as support for the development of the charging network. It also

¹³ Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030.

¹⁴ Regulation (EU) 2018/841 on greenhouse gas emissions and removals from land use, land use change and forestry.

identifies the promotion of an increased use of public transportation by reducing tariffs for public transport and expanding the transportation network. The development of alternative fuels such as advanced biofuels and hydrogen, e.g. for long-distance heavy goods and heavy road passenger transport, is also included. The plan envisages renewal of the car fleet and financial support to purchase an electric or hydrogen-fuelled car. The charging grid is to be expanded and car sharing promoted. In the context of the 2050 decarbonisation plan, the transport sector indicates an emission reduction of 53% by 2030 compared to 2005, but the 2050 plan does not explain the expected impact of specific measures. Overall, there is a wide range of different measures planned, although not all of them are very concrete.

Portugal does not have a quantitative target for further emission reductions in the **building** sector. The plan lists the following key actions for this sector: investment in residential and non-residential buildings to bring them up to the nearly zero-energy buildings (NZEB) standard by using a mix of public and private funds.

The plan includes policies and comprehensive measures for the **agriculture and LULUCF** sectors. These focus on the protection of soil fertility, increase carbon sequestration, decarbonisation for livestock, continued support to develop ecosystem services remuneration in rural areas programmes. The plan refers to the common agricultural policy for forestry measures as well.

For **forestry**, the plan envisages increasing the sink capacity of forests through the acquisition of technologies for management, promoting the use of forest residues, supporting forestation, increasing resilience to forest fires and establishing a permanent system for the national forestry inventory.

No adaptation goals are mentioned under the decarbonisation dimension. There are only a few scattered adaptation measures across the respective policies and measures section. In the impact assessment chapter, the NECP describes the national **adaptation** strategy, objectives and current policy framework and also an action programme adopted early 2019 for the period 2020-2030.

Portugal notified the Commission of its long-term strategy on 15 January 2020. Portugal aims to achieve climate neutrality by 2050. This objective covers greenhouse gases emitted in all sectors of the economy, and the natural sinks will compensate for the remaining emissions most difficult to abate. The long-term strategy addresses most of the elements required by Article 15 of the Governance Regulation.

Renewable energy

The **renewable energy contribution** is **47%** of the national gross final energy consumption in 2030. This contribution is sufficiently ambitious, as it is above the 42% share in 2030 that results from the formula in Annex II of the Governance Regulation. Portugal provided an indicative trajectory for overall renewables share at 31% in 2020. For 2022 and 2025 the trajectory reaches the reference points (18% and 43% of its contribution to EU target), but for 2027 the indicated share reaches only 62.5%.

Renewable electricity is projected to reach an ambitious 80% in 2030 (60% in 2020). Photovoltaic (PV) plays a key role in this increase (9.0 GW in 2030 compared to 2GW in 2020), together with wind (9.3 GW in 2030 compared to 5.4 GW in 2020) and hydro with storage (for which the combined capacity will be around 18 GW in 2030). To achieve the significant increase in PV, Portugal will launch new PV-specific auctions. Repowering will be the main driver of the

projected capacity increase of onshore wind. New geothermal capacity is expected in the Azores region, and offshore wind, concentrated solar power and marine energy will come mostly through pilot projects. The plan also indicates specific legislation that has been put in place to promote self-consumption and renewables communities¹⁵. In addition, Portugal specifies the implementation of an electronic platform-based one-stop shop for managing the licensing of projects. Information on the promotion of renewable power purchase agreements is not included in the plan.

The use of renewable energy in the **heating and cooling** sector is projected to reach 38% by 2030 (increase of 4% points compared to the expected 2020 share). However, the 2020 baseline figure could still be revised due to revised accounting for heat pumps. This falls short of the indicative 1.3 percentage points increase as an annual average calculated for the periods of 2021 to 2025 and 2026 to 2030. The renewables consumption in the heating and cooling sector increases 3% from 2020 to 2030, mostly due to renewable gas and co-generated heat from renewable sources (51% biomass in 2030). The role of waste heat and cold was not included. Heat from high-efficiency cogeneration using renewable fuels account for 36% and will be prioritised for energy-intensive industries. The contribution of heat pumps (5.1%) and solar thermal energy (4.6%) is set to provide efficient solutions for heating needs in residential and service buildings and provide low/medium temperature heat requirements for industry. Renewable-based gases are set to grow to 2.7% by 2030. The plan indicates that with the exception of new high-density housing estates, or proximity to services buildings which already have cogeneration, there is limited potential for district heating (and cooling) networks.

For the **transport sector**, the plan includes the objective to reach a 20% share of renewable energy by 2030, to be achieved by an increase in the use of renewable electricity and to a lesser extent by an increase in advanced biofuels and green hydrogen. First generation biofuels are set to decrease by one third in 2030 compared to 2020. The plan indicates several policies and measures that will be put in place to promote electric mobility, modal shifting and to promote the production of advanced biofuels with national indigenous sources. The plan also states that the necessary changes will be carried out to ensure the complete phase-out of conventional biofuels with high ILUC risk by 2030. Although the plan outlines how the renewable energy production by technology will evolve in the transport sector, it does not include details in the projections regarding the application of the different rules to calculate the share of renewables in transport in 2030 (e.g. use of multipliers and shares of first generation biofuels, advanced biofuels and high indirect land-use change-risk biofuels).

Energy efficiency

Based on the information provided in the plan, it is assumed that Portugal's **national contribution for energy efficiency** in 2030 amounts to 21.5 Mtoe for primary energy consumption, translating into 14.9 Mtoe of final energy consumption. Instead of pre-determined absolute consumption levels by 2030, the NECP presents a range of 15.6-21.5 Mtoe for primary energy and 14.4 -14.9 Mtoe for final energy. The methodology used to calculate these values is based on the estimation of a baseline using the PRIMES 2007 model. The targets will be achieved through the adoption of alternative measures under Article 7 of the Energy Efficiency

¹⁵ In line with Articles 21 and 22 of RED II, with decentralised PV set to reach 2GW in capacity in 2030.

Directive¹⁶, taking into account the objective of achieving annual energy savings in final consumption of 0.8% for the 2021-2030 period, amounting to a cumulative value of **6 739 682 toe**. These measures include the promotion of more efficient equipment, better management of energy consumption in various sectors, the adoption of more efficient agricultural and forestry practices in energy and water, and the promotion of energy and resource efficiency. Under these ‘umbrella’ actions, there are several other individual measures, which should presumably be added to the ones already implemented in the last two national energy efficiency action plans (NEEAP). Since there is no indication of the potential energy savings for each measure, it is not possible to assess whether these are sufficiently ambitious for the Portuguese intentions.

Regarding **energy efficiency in buildings**, the plan does not include targets for 2030 or beyond. The plan includes a number of specific actions aimed at addressing relevant sectors in an integrated and structured manner; however, the information provided is limited, and the figures available are not specific to the building sector or structured in a way that would allow an assessment of their impact¹⁷.

Energy security

The plan includes the ambition to reduce energy import dependency from 79% to 65% by 2030.

Maintaining high levels of security of supply is a priority, and the ongoing transformation of the energy system with 80% renewable **electricity** by 2030 will help reduce external energy dependency. The plan takes into account system adequacy and defines indicators and expected values. There are also measures aimed at ensuring suitable planning, including a strategic vision for the electricity network for 2030 and 2050, considering models for the energy transitions and assessing long-term security of supply.

As regards **diversification of sources and routes**, the plan does not include a target for diversification, although there is a strategy to further use the LNG terminal in Sines. Other measures in this area include the promotion of external cooperation through existing platforms or the creation of new ones (until 2030). The plan rather focuses on reducing import dependency by increasing the share of renewable energy using Portugal’s potential.

As regards **oil and gas**, the plan refers to oil stocks as well as to some security of gas supply measures. The role of natural gas will be adjusted, with gas projected to remain for electricity generation until 2040 until new technologies are developed (emphasis on hydro and battery storage). After 2040, natural gas would mostly serve industrial needs.

The plan envisages a number of measures and investments in electricity **storage**, in the short term (focus on reversible pumping systems with three projects to become operational by 2026) and medium-long term (batteries, hydrogen). On the latter, there are concrete measures to promote the production and consumption of renewable gases, including specifically a line of action for green hydrogen under which an industrial policy is expected to create a cluster for the production of green hydrogen, among others, leveraging on competitive PV. The planned policies and

¹⁶ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency as amended by Directive (EU) 2018/2002.

¹⁷ Portugal only submitted a draft long-term renovation strategy in accordance with Article 2a of the Energy Performance of Buildings Directive, with indicative milestones for the renovation of the building stock and relevant measures and financing instruments to support renovations.

measures are considered sufficient in relation to the achievement of the objectives. The plan does not include considerations on cybersecurity in the energy sector.

The plan makes adequate links with the **emergency plans** for gas and electricity provided for by the applicable sectorial rules.

Internal energy market

Portugal sets the objective of 15% **interconnection** by 2030, including 3000MW of bidirectional electricity. The plan focuses on implementation of key infrastructure projects, notably projects of common interest.

An analysis of how the rising electricity demand affects the level of electricity interconnectivity and the need for infrastructure is included. The plan envisages the use of flexibility resources to ensure system adequacy and implement an interruption manager system for generation facilities of more than 1MW by 2020. It describes a few specific activities aiming to take on board as yet undefined flexibility criteria into network planning instruments by 2025. Demand response and storage will further develop through the transposition in 2020-2021 of aggregation system services under a general remuneration scheme.

The plan provides a comprehensive description of the current situation, including energy prices with appropriate quantification of customers, social tariffs, and consumers associated. The plan gives a comprehensive overview of new rules from end 2019 for distributed and self-generation. These allow and promote active consumers and energy communities, include the creation of an information web portal on distributed and self-generation and energy communities by 2022. It supports technically and financially the setting-up of self-consumption in partnership with municipalities in 2020-2025.

However, the plan provides limited details or targets for measures to promote information for consumers, the roll-out of smart meters and electric mobility¹⁸. Likewise, for digitalisation and smart grids, it describes generic plans to be carried out during a wide period (2020-2030).

With regard to wholesale electricity and gas markets, the description of the Portuguese markets is very limited. There are no national objectives in this respect, in spite of the recommendation to have measures to increase the competitiveness of the electricity and gas markets.

Regarding **energy poverty**, Portugal does not report the number of households affected. However, it announces the development of a long-term strategy to: provide a state of play, develop indicators and monitoring strategies, set energy poverty reduction goals (medium and long-term) at national, regional and local level, and propose specific measures and forms of financing.

Research, innovation and competitiveness

Portugal has set an **investment target of 1.8% of its GDP in research and innovation** by 2020 and 3% by 2030. Portugal has also established sub-targets for investments of 0.2% of GDP in research and innovation in energy, and 0.2% of GDP in research and innovation in water and climate, by 2030. Portugal is committed to develop actions to ensure its leadership in the deployment of renewable energy sources and new low carbon technological solutions.

¹⁸ The plan foresees a new cost benefit analysis for the roll out of smart meters, but without a date.

The NECP identifies relevant areas for research and innovation in national programmes: (i) energy management smart systems and new infrastructures; (ii) energy storage; (iii) low-carbon technologies; (iv) energy efficiency; (v) hydrogen as an energy carrier.

In its final energy and climate plan, Portugal sets the target by 2030 to have a final renewable hydrogen consumption of 65 ktoe (756 GWh) in the transport sector, representing about 7% of the renewable fuels for transport, with a prominent role for hydrogen as energy carrier. The NECP envisages the adaptation of the natural gas infrastructure and the promotion of an industrial policy focusing on hydrogen and renewable gases. Portugal plans to assess the conversion of two coal-fired power plants to renewable hydrogen and is also considering the deployment of renewable hydrogen with a territorial perspective, creating hydrogen valleys or ecosystems coupling a 1GW electrolyser with a solar farm. Portugal intends also to promote training for professionals in the field of hydrogen, and considers exporting renewable hydrogen.

In addition, Portugal is developing a set of 15 thematic agendas for research and innovation coordinated by the Foundation for Science and Technology (*Fundação para a Ciência e Tecnologia*). On the European strategic energy technology plan (**SET plan**), Portugal does not allocate funding programmes under each implementation plan and does not explain how the SET plan helps to reach their national energy and climate objectives.

As for **competitiveness**, Portugal lists developing an innovative and competitive industry among the national targets for 2030. This includes promoting industrial modernisation, focusing on innovation, decarbonisation, digitalisation (industry 4.0) and circularity. Although the plan does not set national competitiveness targets, it states that the promotion of research, innovation and competitiveness in support of the implementation of the NECP is essential for the plan's success. Furthermore, it acknowledges the relevance of providing energy and climate competitiveness programmes.

4. COHERENCE, POLICY INTERACTIONS AND INVESTMENTS

The plan covers **interlinkages** of decarbonisation and growth, identifying its green potentials. It further links energy security and adaptation to climate risks, to renewable energies development. The plan mentions that better forest management practices would enhance the forest sink and increase its resilience to the adverse effects of climate change such as forest fires and land degradation. There is a high degree of consistency between policies and targets, although it does not always provide information on interactions between the various policies and measures.

The NECP provides detailed information on the **investment needs** per sector (electricity, transport, buildings, industry and other) until 2040/2050, assessed in the national climate neutrality 2050 plan. There is, however, limited information about how in the policies and measures investments are allocated. Nevertheless, from the descriptions it can be concluded that Portugal has at this point a clear idea how to streamline its financial flows in terms of governance in order to support the economy's decarbonisation.

The same modelling provides a global investment estimate of EUR 407-431 billion for the energy sector from 2021-2030 to achieve carbon neutrality by 2050. As EUR 396-417 billion (29 billion yearly) are needed to replace existing assets, the additional amount needed is EUR 11-15 billion (1 billion yearly) or 3% of the global investment from 2016-2030, and 13% from 2031-2040. The plan does not provide details about the methodology to arrive at these estimates.

The private sector and households will provide the majority of this investment. The 2021-2027 multiannual financial framework will be one of the **main sources of public financing** for decarbonisation. The national investment plan (PNI 2030) will contribute over 60% of the investments related to decarbonisation. Tax policy (including the green tax) will be an important instrument to streamline public funding to finance decarbonisation. Revenues from the ETS are allocated to the Portuguese Environmental Fund (EF) and will finance energy efficiency measures, renewable energies, the tariff reduction support programme for public transport, and may also constitute the national contribution in projects to be submitted for EU funding. The plan does not refer to the possible use of ESR overachievements for transfer as a source of funding.

The description of existing **energy subsidies**, in particular for fossil fuels, focuses on tax exemptions. The plan uses international-based definitions for fossil fuel subsidies, under which tax expenditures for fossil fuels also fall. A timeline to phase out energy subsidies, in particular fossil fuel subsidies, is not mentioned in the final plan.

The plan provides a rather good **macroeconomic assessment** of the impact of planned policies and measures. However, this assessment could be improved by adding estimations related to the social dimension i.e. the impact of the green transition on overall employment as well as that in specific sectors.

Regarding the **just and fair transition** aspects, Portugal only assessed to a limited extent impacts of policies and measures on skills, social aspects and employment. The missing strategy to combat energy poverty will, according to planned measures, be developed shortly.

The final plan provides broad quantitative estimates of impacts of carbon neutrality on **air quality and air emissions policy** under the country's national air pollution control programme (NAPCP), and a qualitative description of the impacts of general climate and energy measures on air pollutants. The resulting reduced pollutants from energy are insufficient to comply with air pollution ceilings by 2030. Although the plan is aligned with the 2019 NAPCP, data of the latter refers only to 2014-2020 and is hence already outdated.

The plan provides ample and well founded links between the **circular economy** and its potential for reducing GHG emissions, including interactions of territorial policies, the circular economy and decarbonisation. The relevant impacts from circularity are estimated for value chains of various sectors, including mobility, agri-food, forestry, construction and waste. It has made an attempt to quantify the GHG emissions coming from the circular economy.

Biodiversity in relation to co-benefits with other policies is mentioned in the plan, with concrete examples (e.g. biodiverse pastures, less fertilisers, organic soils), and an environmental fund linked to that.

The **Energy Efficiency First principle** is mentioned in the document and represents the second of the eight objectives listed in the NECP. Energy efficiency also enjoys a large consideration across the whole NECP. However, the role of energy efficiency for reaching other objectives is less considered, as the NECP focuses much more on renewables, given that Portugal is endowed with a significant renewables potential. Also, the plan did not elaborate very much on the potential for energy savings and their co-benefits and only mentioned it for buildings. Information is also lacking on co-benefits of adaptation and trade-offs for energy efficiency, such as in the thermal management of buildings.

The final version of the plan partially complies with **data transparency** requirements and with the use of European statistics.

5. GUIDANCE ON THE IMPLEMENTATION OF THE NATIONAL ENERGY AND CLIMATE PLAN AND THE LINK TO THE RECOVERY FROM THE COVID-19 CRISIS

Portugal needs to swiftly proceed with implementing its final integrated national energy and climate plan, as notified to the Commission on 31 December 2019. This section provides some guidance to Portugal for the implementation phase.

This section also addresses the link between the final plan and the recovery efforts from after the COVID-19 crisis, by pointing at possible priority climate and energy policy measures Portugal could consider when developing its national recovery and resilience plan in the context of the Recovery and Resilience Facility

Guidance on the implementation of the national energy and climate plan

In the plan, Portugal confirms the target for non-ETS greenhouse gas emissions reduction by 2030, compared to 2005, of -17%, in line with the Effort-Sharing Regulation (ESR). With a continuation of current policies, Portugal projects to meet this target with a margin of 23%. It also plans further measures in the building, transport and agriculture sectors. With the long-term vision to achieve carbon neutrality by 2050, Portugal is set to overachieve its 2030 ESR target, even though additional efforts in the services, residential and agriculture sectors still can be made. Portugal has the potential to use cost-effective over-achievements for transfers to other Member States.

The Portuguese contribution to the EU 2030 renewables target is sufficiently ambitious with Annex II of the Governance Regulation, whereas its energy efficiency contribution is of modest ambition. To contribute more to the EU climate and energy targets and strengthen the green transition, Portugal's plan therefore still leaves scope to further develop and reinforce policies and measures on both renewables and energy efficiency.

On **renewables**, Portugal committed to achieve 47% renewable energy in gross energy consumption. Portugal would benefit from a swift implementation of the measures, which would be well complemented by further assessment of an increased role of renewables in the heating and cooling sector, identifying the role of waste heat and cold in this sector. In addition, the adoption of measures to facilitate the uptake of power purchase agreements would help to achieve the expected share of renewables in a more cost-efficient way.

On **energy efficiency** Portugal would benefit from adopting and implementing additional policies and measures that would deliver additional energy savings by 2030. Proper assessment of expected impacts of the proposed measures and a detailed elaboration of all the elements required by Annex III of the Governance Regulation would be beneficial for ensuring achievement of the energy saving obligation under Article 7 of the Energy Efficiency Directive. In particular, details and targets for measures to promote information for consumers, the roll-out of smart meters, and electric mobility would help ensure their effective implementation and monitoring. Moreover, it would be beneficial to prepare a detailed plan for digitalisation and smart grids deployment.

Improving energy efficiency in buildings has much potential for speeding up energy savings and contributing to the recovery of the economy after the COVID-19 pandemic. Building on the momentum of the **Renovation Wave** initiative¹⁹, there is scope for Portugal to step up its efforts to improve the energy performance of the country's existing building stock with specific measures, targets and actions, while giving due attention to energy poverty. Further support for the renovation of public and private buildings could be provided through increased public funding and by leveraging EU and national budgets with private money, combining grants, lending, guarantees and loan subsidies. Portugal is expected to provide a robust and comprehensive long-term renovation strategy, in accordance with Article 2a of the Energy Performance of Buildings Directive. The long-term renovation strategy is required to set out a roadmap for decarbonisation by 2050, with ambitious milestones for 2030, 2040 and 2050, measurable progress indicators, expected energy and wider benefits, measures and actions to renovate the building stock, and a solid finance component with mechanisms for mobilising public and private investment.

As regards **energy poverty**, Portugal is encouraged to consult the Commission Recommendation of 14 October 2020 on energy poverty and its accompanying staff working document providing guidance on the definition and quantification of the number of households in energy poverty and on the EU-level support available to Member States' energy poverty policies and measures. Energy poverty could be, among other measures, addressed through specific support to socially innovative solutions and social enterprises that work on addressing this challenge (e.g. energy-awareness campaigns, retraining unemployed as energy advisors, supporting green installations by co-operatives, buying energy-saving appliances for social enterprises to rent out).

Concerning the **internal energy market**, Portugal is invited to set forward-looking objectives for market integration.

Portugal would benefit from defining clear indicators to track achievement of milestones towards its **research and innovation and competitiveness** objectives. Over time, the gathering of granular research, innovation and competitiveness data will be useful to strengthen this process. Portugal needs to ensure the link with the SET plan activities undertaken. Portugal would also benefit from further strengthening the link between the competitiveness objective and the policies and measures to put in place for the different sectors by 2030.

Identifying **investment needs** and securing adequate funding will be key to delivering on Portugal's ambitious climate and energy objectives. The plan provides some information on the investment needs per sector (electricity, transport, buildings, industry and other) until 2040/2050 and estimates a global investment of EUR 407-431 billion for the energy sector from 2021 to 2030 to achieve carbon neutrality by 2050. As EUR 396-417 billion (29 billion yearly) are needed to replace existing assets, the additional amount needed is EUR 11-15 billion (1 billion yearly) or 3 % of the global investment from 2016-2030, and 13% from 2031 to 2040. The front-loading of such public investment projects supporting the green transition can have an important role in fostering the economic recovery.

¹⁹ Communication 'A Renovation Wave for Europe – greening our buildings, creating jobs, improving lives', COM(2020)662 and SWD(2020)550.

Portugal is invited to continue ongoing efforts on **regional cooperation** with a view to intensifying exchanges and initiatives that will facilitate the implementation of its national energy and climate plan, in particular as regards relevant cross-border issues²⁰. Involvement in the TEN-E High-Level Group for South-West Europe would enable Portugal to continue developing interconnections in the future. Portugal is also invited to better exploit the potential of the **multilevel climate and energy dialogues** to actively engage with regional and local authorities, social partners, non-governmental organisations, the business community, investors and other relevant stakeholders and to discuss with them the different scenarios envisaged for its energy and climate policies.

Portugal is invited to extend and update reporting on **energy subsidies** and continue action to phase out subsidies, in particular for fossil fuels. The green transition in Portugal would receive a further boost from a rapid phase-out of the fossil fuel subsidies identified in the NECP and recent Commission analyses. This would involve the further development and implementation of concrete plans with associated timelines, coupled with measures to mitigate the risk of households' energy poverty.

For all investments implementing the national energy and climate plan, Portugal is invited to ensure these are in line with national, regional or local plans for **air pollution reduction**, such as the National Air Pollution Control Programme (NAPCP), and relevant air quality management plans.

In implementing its plan, Portugal is invited to make the **best possible use of the various funding sources available**, combining scaled-up public financing at all levels (national and local, as well as EU funding) and leveraging and crowding in private financing. Tables 1 And 2 of Annex I provide an overview of EU funding sources which should be available to Portugal during the forthcoming multiannual financing period (2021-2027) as well as EU funding addressed to all Member States and companies. For the forthcoming period, the European Council has committed to the mainstreaming of climate action in all EU programmes and instruments and to an overall target of at least 30% of EU funding to support climate objectives. At the same time, EU expenditure should be consistent with the Paris Agreement and the 'do no harm' principle of the European Green Deal. At EU level, funding will be available for Portugal from the Innovation Fund and will also be based on revenues from the auctioning of allowances under the EU emissions trading system.

Link to the recovery from the COVID-19 crisis

The vast majority of Member States' final national energy and climate plans were drafted before the COVID-19 crisis, and the present Staff Working Document assesses Portugal's plan in that context. Nevertheless, the implementation of Portugal's final integrated national energy and climate plan will need to fully take into account the context of the post-COVID-19 recovery.

In the context of the Recovery and Resilience Facility, which is expected to be operational on 1 January 2021, **the final plan constitutes a strong basis for Portugal to design climate and**

²⁰ In this context, the Commission will help address related issues in a strategic manner in its upcoming Strategy for Offshore Renewable Energy by identifying key actions in the area of maritime planning, upscaling technologies, and a new approach to infrastructure planning and offshore renewables capacity building.

energy-related aspects of its national recovery and resilience plan, and to deliver on broader European Green Deal objectives.

In particular, **mature investment projects outlined in the plan, as well as key enabling reforms that address inter alia, investment-barriers, would need to be frontloaded as much as possible**. The link between investments and reforms is of particular relevance for the national recovery and resilience plans, to ensure a recovery in the short to medium term and strengthening resilience in the longer term. In particular, Member States' recovery and resilience plans should effectively address the policy challenges set out in the country-specific recommendations adopted by the Council.

In addition, **the Commission strongly encourages Member States to include in their recovery and resilience plans investment and reforms in a number of 'flagship' areas**²¹. In particular, the 'Power up', 'Renovate' and 'Recharge and refuel' flagships are directly related to energy and climate action and to the contents of the final national energy and climate plans. Measures under the 'Reskill and upskill' flagship are also essential to foster the climate and energy transition in all Member States.

In turn, the Recovery and Resilience Facility will provide opportunities to accelerate Portugal's green transition while contributing to economic recovery. In order to follow the European Council's commitment to achieve a climate mainstreaming target of 30% for both the multiannual financial framework and Next Generation EU, **Portugal's recovery and resilience plan will have to include a minimum of 37% expenditure related to climate**.

Based on Portugal's final national energy and climate plan, and on the investment and reform priorities identified for Portugal in the European Semester, **the Commission services invite Portugal to consider, while developing its national recovery and resilience plan, the following climate and energy-related investment and reform measures:**

- Measures fostering sustainable transport, including through the electrification of the transport sector and ensuring better train interoperability and integration of ports and railway infrastructure;
- Measures to enhance the energy efficiency of buildings, to diversify renewable energy generation and deploy smart grids; measures aimed at strengthening and expanding the transmission and distribution lines including electricity interconnections with neighbouring countries;
- Measures targeted at climate change adaptation, including improved water management, risk prevention and preparedness.

The above mentioned measures are indicative in nature and not meant to be exhaustive. They aim to orient reflections in the development of the national recovery and resilience plan. They do not prejudice the position of the Commission on the actions to be proposed. This position will, inter alia, need to comply with the agreed legislative text on the Recovery and Resilience Facility.

²¹ Cf. Annual Sustainable Growth Strategy 2021 (COM(2020) 575 final), pp. 9-12.

ANNEX I: POTENTIAL FUNDING FROM EU SOURCES TO PORTUGAL, 2021-2027

Table 1: EU funds available, 2021-2027: commitments, EUR billion

Programme	Amount	Comments
Cohesion policy funds (ERDF, ESF+, Cohesion Fund)	22.5	In current prices. Includes funding for European territorial cooperation (ETC). Does not include amounts transferred to the Connecting Europe Facility.
Common agricultural policy – European Agricultural Fund for Rural Development, and direct payments from the European Agricultural Guarantee Fund.	8.2	In current prices.
Recovery and Resilience Facility	13.2	In 2018 prices. Indicative grants envelope, sum of 2021-2022 and estimated 2023 commitments. Based on the Commission’s summer 2020 GDP forecasts.
Just Transition Fund	0.2	In 2018 prices. Commitments both under the multi-annual financial framework (MFF) and Next Generation EU.
ETS auction revenue	0.3	Indicative: average of actual 2018 and 2019 auction revenues. The amounts in 2021 to 2027 will depend on the quantity and price of auctioned allowances.

Table 2: EU funds available to all Member States, 2021-2027, EUR billion

Programme	Amount	Comments
Horizon Europe	91.0	In current prices. Includes Next Generation EU credits.
InvestEU	9.1	In current prices. Commitments both under the multi-annual financial framework (MFF) and Next Generation EU. Includes the InvestEU fund (budgetary guarantee to public and private investment) and the advisory hub (technical advice). Does not consider appropriations available to beneficiaries through implementing partners, such as the European Investment Bank.
Connecting Europe Facility <ul style="list-style-type: none"> • Transport • Energy 	24.1 5.8	In current prices. The commitment for transport includes the contribution transferred from the Cohesion Fund. Excludes Connecting Europe Facility Military Mobility funding for dual use infrastructure.
Recovery and Resilience Facility	360.0	In 2018 prices. Non-allocated commitments for loans. Loans for each Member State will not exceed 6.8% of its gross national income.
Technical Support Instrument	0.9	In current prices.
Programme for Environment and Climate Action (LIFE)	5.4	In current prices.
European Agricultural Fund for Rural Development	8.2	In current prices. Commitments under Next Generation EU.
Innovation Fund	140.0	Approximation: 7/10 of the allocations of ETS allowances to provide revenue to the Innovation Fund for 2021-2030 and assuming a carbon price of EUR 20 per tonne.

Note to both tables

The figures provided by programmes under the EU budget include both the proposals under the forthcoming multiannual financial framework, and the reinforcement of these under the Next Generation EU instrument outside the EU budget.

The figures quoted in this document are based on the conclusions of the European Council of 17-21 July 2020. They however do not prejudge the outcome of the ongoing discussions between the European Parliament and the Council on the elements of the recovery package, such as the Multiannual Financial Framework, the sectoral programmes, their structure and budgetary envelopes, which will be concluded in accordance with their respective adoption procedure.

For most of the above funds, support to the climate and energy transition is one objective among others. However, for the forthcoming period, the European Council has committed to the mainstreaming of climate action into all EU programmes and instruments and to an overall target of at least 30% of EU funding to support climate objectives. EU expenditure should also be consistent with the Paris Agreement and the 'do no harm' principle of the European Green Deal.

Some of the programmes listed in Table 2 provide funding through open calls to companies, not public administrations.

ANNEX II – DETAILED ASSESSMENT OF HOW COMMISSION RECOMMENDATIONS HAVE BEEN ADDRESSED

Recommendations		Assessment	
Decarbonisation - GHG	Provide quantifiable information on Policies and Measures for different dimensions (WEM and WAM) to support results.	Partially addressed	The plan provides information on policies and measures but annual projections are not provided for 2021-2030. It is also not explained whether Portugal intends to use cost-efficient overachievements for possible transfers to other Member States.
Decarbonisation - renewables	Underpin the welcome level of ambition of a 47 % renewable energy share for 2030 as Portugal's contribution to the Union's 2030 target for renewable energy by detailed and quantified policies and measures that are in line with the obligations requested in Directive (EU) 2018/2001 of the European Parliament and Council in a way that enables a timely and cost-effective achievement of this contribution.	Largely addressed	The plan includes significant additional information on the policies and measures to achieve the underlying goals, particularly for the electricity sector, although many remain generic and difficult to assess.
	Increase the level of ambition of renewables in the heating and cooling sector to meet the indicative target included in Article 23 of Directive (EU) 2018/2001.	Not Addressed	The plan did not address the recommendation to raise the ambition in the heating and cooling sectors, indicating this aspect will be revised in the updated version of NECP that will be submitted in 2024.
	Put forward measures and details to meet the increased transport target in Article 25 of Directive (EU) 2018/2001, including further details on contributions of eligible fuels.	Partially addressed	The final NECP provides an ambitious objective (20%) and a better description on the pathways for its achievement, including measures to electrify transport, develop advanced biofuels and reduce first generation biofuels. However, it does not include detailed information in their projections on the application of the rules to calculate the transport target (e.g. use of multipliers, and shares of advanced biofuels and first generation biofuels).
	Reduce the complexity and regulatory uncertainty, further detail how it will address the simplification and optimisation of the framework related to licensing and permitting using one-stop-shops, provide additional details on the enabling frameworks for renewable self-consumption and renewable energy communities, facilitating access to finance, and details on promoting power purchasing agreements..	Fully addressed	The plan presents substantial progress on measures for simplifying administrative procedures and on promotion of self-consumption and renewables communities.

Energy efficiency	Substantially increase ambition for final energy consumption contribution, in view of the need to increase the level of efforts to reach the Union's 2030 energy efficiency target and identify additional policies and measures that could deliver further energy savings by 2030.	Partially addressed	Portugal did not raise the overall level of ambition in energy efficiency. However, it presented slightly more reduced levels for final energy consumption and provided further information on measures and policies to be put in place targeting energy efficiency. The NECP provides some information on the renovation of the building stock, but further details on the indicative milestones and relevant policies and measures will be determined in the long-term renovation strategy, which has not been submitted yet.
	Provide a proper quantification of the energy savings expected from the planned policies and measures as part of a more detailed impact assessment and indicate how they would contribute to the national energy efficiency contributions.	Partially addressed	There is more information on the with additional measures (WAM) and with existing measures (WEM) scenarios, but there is no connection between individual measures (or umbrella actions) with the targets. NECP still lacks information on the quantitative impact of the policies and measures.
	Adequately reflect the envisaged updates and improvements to existing support schemes in the final integrated national energy and climate plan and in the following progress reports. Scale them up significantly to allow for the achievement of the indicated energy savings goals.	Partially addressed	The annex including information on methodologies and policies and measures for achieving the energy savings requirement in accordance with Article 7 of Directive 2012/27/EU was not provided. Work is ongoing on this front.
Energy security	No recommendation	n.a.	
Internal energy market	Define forward-looking objectives and targets concerning market integration, in particular measures to develop more competitive electricity and gas markets, including progressing towards fully market based prices.	Partially addressed	The recommendations regarding the internal markets were partially followed, but do not include new forward-looking objectives for market integration. No measures are provided which explicitly focus on progressing towards fully market-based prices. Measures allowing self-consumption and energy communities should lead to increased competition on the markets through new market entrants.

Research, innovation and competitiveness	Further clarify the national objectives and funding targets in research, innovation and competitiveness, specifically related to the Energy Union, to be achieved between 2021 and 2030, so that they are readily measurable and fit for purpose to support the implementation of targets in the other dimensions of the integrated national energy and climate plan.	Largely addressed	The plan is a substantial improvement and now includes specific relevant targets for investment in research and innovation related to energy and climate objectives, including additional information on patents and researchers. These efforts are considered sufficient in relation to achieving the set objectives. The main means of implementation remain EU financing instruments. As regards competitiveness, specific objectives are hardly mentioned.
	Underpin such objectives with specific and adequate policies and measures, including those to be developed in cooperation with other Member States, such as the Strategic Energy Technology Plan.	Partially addressed	Cooperation with the strategic energy technology (SET) plan is only mentioned generally.
Investments and funding sources	Provide a general overview on the investment needed to modernise its economy by reaching its energy and climate objectives, articulated with its national investment plan.	Largely addressed	The plan includes detailed calculations of investment needs of the various sectors over the period 2021-2030 to achieve carbon neutrality by 2050. However, the plan does not provide details on the methodology to arrive at these estimates.
	Provide a general assessment of the sources of that investment, including appropriate financing at national, regional and Union level.	Largely addressed	It includes an overview of EU and national programmes, and the private sector. Portugal is committed to redirecting financial flows to promote decarbonisation and energy transition, fostering the development of a favourable framework for sustainable financing and greater involvement of the financial system in these areas in the coming decade. However, no information on sources from regional budgets is provided. In addition, an indicative source of financing is provided for each of the policy measures, often mentioning a combination of EU and national funding.
	Consider also the cost-effective generation of transfers to other Member States under Regulation (EU) 2018/ 842 of the European Parliament and the Council ⁹ as funding source.	Not addressed	There is no information provided on the cost-effective generation and use of transfers to other Member States under the ESR as a funding source.
Regional cooperation	Intensify the existing good regional cooperation with Spain and France. The focus of the regional exchanges should be on internal energy market and energy security areas, in particular cross-border and cross regional interconnections.	Fully addressed	Portugal discussed its NECPs in a regional setting with France and Spain. The plan highlights the high relevance of regional cooperation between those countries through the high-level group for South Western Europe for further developing

			interconnections and promoting market integration.
	Consider strengthening measures related to regional cooperation in the areas of renewable energy and energy efficiency.	Partially addressed	The regional cooperation remains focused on interconnections of electricity and gas. There is only some general information provided on regional cooperation in terms of renewable energy or energy efficiency.
Energy subsidies	List all energy subsidies	Partially addressed	In comparison with the draft plan, a comprehensive and quantitative overview of tax exemptions for fossil fuels has been included in the final plan. A detailed overview of renewable energy subsidies has not been included in the final plan
	List in particular fossil fuel subsidies	Largely addressed	Portugal has included a detailed list of energy subsidies for fossil fuels. In general, the overview of fossil fuel tax incentives mentioned in the plan is in line with recent Commission analyses on energy subsidies.
	List actions undertaken as well as plans to phase them out	Largely addressed	The national budget for 2018 sets out the phased elimination of the exemptions for the petrol and energy products tax, and a working group has been created to identify and study incentives detrimental to the environment and to propose their gradual elimination. Portugal states its intention to eliminate subsidies detrimental to the environment and has included actions to achieve this. A timeline for the phase-out of subsidies has not been included.
Air quality	Complement the analysis of the interactions with air quality and air emissions policy, presenting the impacts on air pollution for the various scenarios, providing underpinning information, and considering synergies and trade-off effects.	Partially addressed	The final NECP provides broad quantitative estimates of the impacts of the carbon neutrality scenario on NEC-regulated air pollutants. However, they are only presented for one scenario without providing supporting information, e.g. for which scenario the projected emission reduction applies or a sectoral split of the projections. It also provides a qualitative description of the impacts of general climate and energy measures on air pollutants, albeit very briefly. However, the NECP also explains that, although being aligned with the NAPCP submitted in 2019 (which is based on data referring only to the period 2014-2020, hence already outdated), additional air-related measures will have to be developed.

Just transition and energy poverty	Integrate just and fair transition aspects better, notably by providing more details on social, employment and skills impacts of planned objectives, policies and measures.	Partially addressed	The plan mentions the business opportunities that arise from carbon neutrality measures and how this could transform into job creation (e.g. sectors such as renewable energy production, urban rehabilitation, research, innovation and development). The plan lacks details on employment and skills, notably on data available for the impact assessment of this transition.
	Further develop the approach to addressing energy poverty issues, including by providing an assessment of the number and type of households in energy poverty and objectives for reducing energy poverty as required by the Regulation (EU) 2018/1999.	Partially addressed	Portugal added some new information about how it intends to tackle energy poverty and just transition. However, it only refers to a future strategy to be developed and does not provide specific and measurable objectives nor concrete measures and policies to address these issues. In addition, no assessment is provided regarding the impacts of energy and climate policies on social, employment and skills aspects, nor is there information on the number or type of households in energy poverty.