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Council of Ministers Resolution No 20/2013

The XIX Constitutional Government has been implementing an energy model based on economic rationality and sustainability, by combining measures to promote energy efficiency and the use of energy from indigenous renewable sources as well as reducing extra costs which increase energy prices.

Within the framework of European '20 – 20 – 20' targets, which aim to achieve, by 2020, (i) a 20% reduction in greenhouse gas emissions as compared to 1990 levels; (ii) a 20% share of energy from renewable sources in final gross consumption and (iii) a 20% reduction of primary energy consumption with regard to the consumption forecast for 2020 (based on the 2007 Baseline by applying the European Commission's PRIMES model), by increasing energy efficiency, a general target was established for Portugal, to be achieved by 2020, to reduce primary energy consumption by 25% along with a specific target for Public Administration of achieving a reduction of 30%. As part of the plan to use energy from indigenous renewable sources, Portugal is striving to ensure that the goals defined for 2020, *viz*. that 31% of the final gross energy consumption and 10% of energy used for transport should be derived from renewable sources, are achieved at the least possible cost for the economy. Simultaneously, Portugal also aims to reduce the nation's energy dependence and ensure security of supplies, by promoting a balanced energy mix.

To this end, and in order to implement the Government Programme and the Main Plan Options for 2013, approved by Law No 66-A/2012 of 31 December 2012, as part of the framework of the 5th Option 'The Challenge for the Future – Priority Sectoral Measures', in the section on the 'Energy Market and Energy Policy', the XIX Constitutional Government aims to pursue, among others, the goals of: (i) ensuring the continuity of measures to develop an economically rational energy model, which ensures sustainable energy costs without compromising the competitiveness of companies or the quality of life of its citizens; (ii) ensuring a substantial improvement in the nation's energy efficiency, by implementing the National Energy Efficiency Action Plan (NEEAP) and the National Renewable Energy Action Plan (NREAP), after concluding the respective review and reinforcing coordination between the current programmes to support energy efficiency (Energy Efficiency Fund, Plan to Promote Efficient Electric Energy Consumption, Innovation Support Fund, funds which are part of the National Strategic Reference Framework - NSRF), reinforcing their resources, and concluding the implementation of the Public Administration Energy Efficiency Programme – ECO.AP; and (iii) continuing to reinforce the diversification of primary energy sources, wherein the investment in renewable sources will be reassessed and a new remuneration model will be presented so that more efficient technologies continue to play a relevant role.

These objectives have also contributed towards pursuing the environmental target of limiting, by 2020, greenhouse gas emissions in sectors not covered by the European Union Emissions Trading Scheme (EU ETS) to 1%, as compared to 2005 values, within the framework of a competitive and low carbon economy.

The NEEAP and NREAP are energy planning tools which establish ways of achieving the targets and international commitments assumed by Portugal with regard to energy efficiency and the use of energy from renewable sources. In addition to intensifying the goals to be achieved, the said plans also identify existing barriers, as well as the potential for improvement in terms of energy efficiency and incorporating energy derived from renewable sources into various sectors of activity, with a view to establishing the most suitable programmes and measures for complying with the said commitments, keeping in mind the current national situation.

European Parliament and Council Directive No 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services, and repealing Council Directive No 93/76/EEC, transposed by Decree-Law No 319/2009 of 3 November 2009, established an indicative general target of achieving energy savings of 9% by the ninth year after the implementation of the Directive (2016) as compared to the period 2001-2005. In Article 14(2) of the Directive the obligation of Member States to periodically submit energy efficiency action plans to the Commission is also set out.

In this context, the first NEEAP for the period 2008-2015 was approved by Council of Ministers Resolution No 80/2008 of 20 May 2008, repealed herein. It considered 4 specific areas of action – Transport, Residential & Services, Industry and the State – and three transversal areas – Behaviour, Inspections and Incentives & Funding. The Energy Efficiency Fund was created by Decree-Law No 50/2010 of 20 May 2010 in order to fund the programmes and measures stipulated in the NEEAP. The Fund's management was entrusted to the NEEAP executive committee, with regard to technical matters, and to the Directorate-General of the Treasury and Finance, with regard to financial matters.

Furthermore, Article 4 of European Parliament and Council Directive No 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources, which amended and subsequently repealed Directives No 2001/77/EC and No 2003/30/EC, established the obligation of each Member State to approve a national action plan for renewable energy and notify the Commission in this regard. It also set national targets for the share of energy derived from renewable sources consumed by the electricity, heating and cooling and transport sectors for the 2020 time frame. In this context, the 2010 NREAP was approved on 30 July 2010, which was communicated to the European Commission on 10 August 2010.

Article 2 of Decree-Law No 141/2010 of 31 December 2010, amended by Decree-Law No 39/2013 of 18 March 2013, which partially transposed said Directive No 2009/28/EC, established the national targets for using energy from renewable sources in final gross energy consumption and transport sector energy consumption by 2020, corresponding to 31% and 10%, respectively.

In turn, Decree-Law No 215-B/2012 of 8 October 2012, which implemented the sixth amendment to Decree-Law No 172/2006 of 23 August 2006 and completed the transposition of European Parliament and Council Directive No 2009/72/EC of 13 July 2009, which established the common rules for the internal electricity market, consolidated the legal system applicable to the production of electricity from renewable energy sources, previously dispersed over various laws. It also completed the transposition of said European Parliament and Council Directive No 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources, amending the concepts of ordinary production system and special production system. The latter ceased to differ from the former only on account of the special systems having access to incentives policies and it also integrated the production of electricity from indigenous resources into the remunerative market system.

The analysis of the implementation of the 2008-2015 NEEAP and the 2010 NREAP made it possible to conclude that, with regard to the prime indicator of the economy's energy efficiency, Portugal today has an energy intensity of primary energy in line with the European Union (EU), but this figure conceals a less positive result when the final energy intensity is measured. In reality, the substantial investments Portugal has made in renewable energy and the lower energy consumption of the residential sector, as compared to the rest of Europe, have disguised an energy intensity of the productive economy which is 27% higher than the European Union average. This result has reinforced the need to intensify efforts for direct actions regarding final energy, within the scope of the NEEAP, particularly in the context of the productive economy, as opposed to a greater level of investment in energy supply, without jeopardising the necessary compliance with the targets of incorporating renewable energy stipulated in the NREAP.

Although both Plans aim to achieve the European '20 – 20 – 20' goals, the 2008-2015 NEEAP and the 2010 NREAP were approved in political and economic contexts different from those today and were based on a distinct planning logic. Therefore, it is now important to revise them in an integrated manner, with a view to promoting synergies which make it possible to maximise an effective and efficient use of scarce human and financial resources, in a more demanding macroeconomic environment, wherein it is imperative to reduce energy consumption. Furthermore, it is important to include a structured assessment of the impact of the measures proposed by each Plan in this review.

Moreover, a joint approach to revising the two plans – NEEAP and NREAP – based on aligning the respective targets for primary energy consumption and the necessary contribution of the energy sector towards reducing greenhouse gas emissions will facilitate decision making processes, especially those involving choices between investing in energy efficiency or promoting the use of renewable energy, making them clearer and more rational.

Therefore the main common lines for the revision of the NEEAP and NREAP are as follows:
(i) aligning the targets of the Plans according to the consumption of primary energy;
(ii) eliminating measures which have not been implemented, which are hard to quantify or have a limited impact and substituting them with new measures or reinforcing

existing measures which cost less and are easier to implement; (iii) a structured assessment of the impacts of the measures proposed by each Plan; and (iv) instituting a joint system to accompany and monitor the Plans.

Specifically with regard to the NEEAP, the main objective of its revision is to plan new actions and goals for 2016, incorporating concerns about the reduction of primary energy for the 2020 time frame contained in European Parliament and Council Directive No 2012/27/EU of 25 October 2012, regarding energy efficiency, which amends Directives Nos 2009/125/EC and 2010/30/EU and repeals Directives Nos 2004/8/EC and 2006/32/EC.

The revision of the NEEAP is based on three lines of intervention:
(i) action (suitability of the measures); (ii) monitoring (review of the methods for monitoring results) and (iii) governance (redefining the NEEAP governance model). To this end, an estimated (current and potential) impact analysis was carried out for all the measures in the NEEAP, in accordance with European norms on monitoring energy efficiency plans and measures. The methods for calculating bottom-up indicators were also redefined with a view to suitably discerning the direct impact of each measure, excluding indirect impacts and aligning the measurement and verification mechanisms with current European directives. Sectoral indicators were also identified, which previously did not exist, in an effort to draw closer to European recommendations in terms of including top-down monitoring. With regard to the governance model, it was necessary to review the NEEAP management structure and to redefine the functions of the different entities in implementing and monitoring the NEEAP measures, as well as to operationalise the Energy Efficiency Fund and consolidate it along with the other programmes to support energy efficiency, so as to optimise incentives, envisaging liaison with the instruments defined in the context of compliance with the goals for reducing greenhouse gases.

With the same time frame as the NEEAP, and considering the estimated effects of implementing the measures contained in this Plan, the NREAP has been redefined in accordance with the current scenario of excess supply of electricity production due to a reduction in demand, so as to make suitable adjustments and mitigate the inherent costs. This does not jeopardise the emphasis on renewable energy sources (RES), very relevant to promoting a balanced energy mix, which reinforces the security of supplies and reduces the risk of price fluctuations for certain commodities and the respective impact on the national energy bill. However, it does entail more careful criteria in selecting support, which must be directed towards RES with greater technological maturity and economic rationality for Portugal, without prejudice to the existence of specific mechanisms to support technologies while in the Research & Development (R&D) phase. The new NREAP thus aims to revise the objective relative weight of each of the RESs in the national energy mix and the respective incorporation targets to be achieved by 2020, according to their production cost (levelized cost of energy) and consequent potential for operating in a market system.

In this context, the revision of the NEEAP for the 2013-2016 period has been carried out in accordance with the principles of said Directive No 2006/32/EC, but keeping in mind the 2020 horizon, in accordance with said Directive No 2012/27/EU.

The NREAP was revised while maintaining Portugal's commitments to renewable energy, pursuant to European Parliament and Council Directive No 2009/28/EC of 23 April 2009, but in articulation with the new scenarios of demand for energy in the 2013-2020 period.

The preparation of the Plans involved various sectors of Public Administration and the document entitled 'Strategic Lines for Revising the National Action Plans for Renewable Energy and Energy Efficiency' was also submitted for public consultation.

This revision of the NEEAP and the NREAP takes into consideration the energy efficiency measures and measures to promote renewable energy sources already contained in the National Programme for Climate Change (PNAC), approved by Council of Ministers Resolution No 104/2006 of 23 August 2006, revised by Council of Ministers Resolution No 1/2008 of 4 January 2008.

With regard to the PNAC for the period 2013-2020 (PNAC 2020), which was prepared pursuant to Council of Ministers Resolution No 93/2010 of 26 November 2010, the fact that this plan will be promoted in articulation with the NEEAP and NREAP is worthy of note, so as to ensure a greater convergence of energy and environmental policies, as tools to achieve a competitive and low carbon economy. This will also ensure that the NEEAP and the NREAP will be monitored parallel to the monitoring of the goals to reduce greenhouse gas emissions.

In turn, the Public Administration Energy Efficiency Programme – ECO.AP, approved by Council of Ministers Resolution No 2/2011 of 12 January 2011 and implemented by Council of Ministers Resolution No 67/2012 of 9 August 2012. This is a tool to implement the NEEAP and has also been duly framed within the review of this Plan, approved by this Resolution.

Finally, as regards redefining energy policy guidelines, Council of Ministers Resolution No 29/2010 of 15 April 2010, which approved the energy strategy (ENE 2020), is being repealed.

Thus:

Pursuant to Article 199(g) of the Constitution, the Council of Ministers hereby resolves to:

1 –Approve the National Action Plan for Energy Efficiency for the period 2013 -2016 (Energy Efficiency Strategy - NEEAP 2016) and the National Action Plan for Renewable Energy for the period 2013 -2020 (Renewable Energy Strategy - NREAP 2020), which constitute Annex I of this resolution, of which it is an integral part.

2 –Attribute the responsibility for monitoring the implementation of the NEEAP and the NREAP to the minister responsible for the energy sector.

3 –Determine that, by the end of the first half of 2013, the minister responsible for the energy sector, in liaison with the ministers responsible for the areas of finance and the environment, will set in motion the legislative and regulatory initiatives necessary for instituting a system to jointly accompany and monitor the implementation of the programmes and measures of the NEEAP and the NREAP, as well as to alter the respective management structures.

4 –Determine that the system for jointly accompanying and monitoring said Plans mentioned in paragraph 3 above must define the respective methodology and the entities involved, the type and frequency of the monitoring, the assessment of the impact of the measures contained in the NEEAP and the NREAP and the entities responsible for them.

5 –Repeal the Council of Ministers Resolutions Nos 80/2008 of 20 May 2008 and 29/2010 of 15 April 2010.

6 – All references to Council of Ministers Resolution No 80/2008 of 20 May 2008 are deemed to be made to this resolution.

Presidency of the Council of Ministers, 28 February 2013. — The Prime Minister, Pedro Passos Coelho.

ANNEX I

National Energy Efficiency Action Plan

(Energy Efficiency Strategy - NEEAP 2016)

National Renewable Energy Action Plan

(Renewable Energy Strategy - NREAP 2020)

Introduction

1. Economic Context and Evolution of Demand for Energy

The current economic environment makes it necessary to consider the impact of such a recessionary scenario on the energy sector during the next decade, more specifically with regard to the European Union objectives defined in European Parliament and Council Directive No 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources (Renewable Energy Directive).

In this regard, in the European context, on 6 June 2012 the Commission issued the communiqué '*Renewable Energy: A Decisive Agent in the European Energy Market*', which reiterated the importance of renewable energy in diversifying energy supplies, with the positive consequences of reinforcing the security of supplies, increasing European competitiveness, economic growth and the simultaneous reduction of greenhouse gases. It nonetheless cautioned against the negative impact of the new macroeconomic scenario in relation to private investment in the energy sector.

At a national level, the economic-financial scenario requires a rationalisation of resources and the need to establish priorities, implement and provide clarity with regard to the main lines of action in the fields of energy efficiency and renewable energy. The combined evolution of a reduction in the consumption of energy (primary and final), the accentuation of a surplus energy supply and funding restrictions thus make it necessary to review national action plans for energy efficiency and renewable energy.

1.1 Evolution of Primary Energy Consumption

In the last decade there have been two distinct cycles with regard to the consumption of primary energy: an initial cycle, between 2000 and 2005 with an increase in consumption, which witnessed an annual average growth rate (AAGR) of 1.4%, and a second cycle, between 2005 and 2010 with a decline in consumption, which witnessed an AAGR of -3.3%. In overall terms, the consumption of primary energy over the last decade had an AAGR of -1.0%.

This trend was accentuated by the fact that the consumption of fossil fuels declined from 2005 onwards, especially the consumption of coal (with an AAGR of -13.1% between 2005 and 2010) and oil (it was common to have an AAGR of -6.7% between 2005 and 2010), caused by a corresponding increase in energy produced from renewable sources.

Data from 2011 on the consumption of energy reinforces the trend seen during the second half of the 2000 decade. Primary energy consumption declined by 1% as compared to 2010. The fall in Gross Domestic Product (GDP) in 2011 is one of the main factors responsible for this trend, it being evident that the economic recession significantly altered national primary energy consumption patterns and the expected evolution up to 2020.

1.2 Evolution of Final Energy Consumption

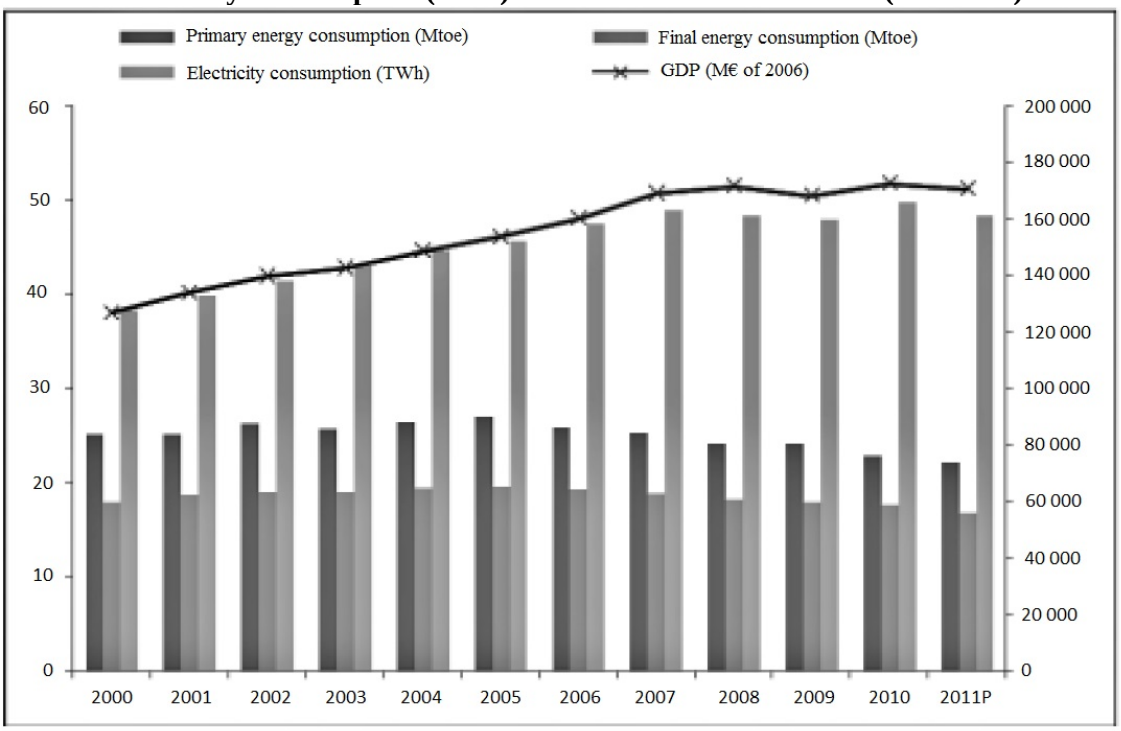
Final energy consumption followed a similar trend as that of primary energy consumption, with an initial cycle of growth in consumption, between 2000 and 2005, which witnessed an AAGR of 1.6%, and a second cycle in which consumption declined, between 2005 and 2010, with AAGR of -2.0%. In overall terms, final energy consumption during the past decade had an AAGR of -0.2%. The economic slowdown from 2008 onwards, which had a transversal impact on all sectors, especially industry and services, and the adoption of energy efficiency measures as part of the NEEAP contributed towards this trend.

Data from 2011 on energy consumption reinforces the trend seen in the second half of the 2000 decade, there having been a 5% reduction in final energy consumption.

With regard to the consumption of electricity, the evolution was different and was almost always positive, having witnessed an AAGR of 2.7% between 2000 and 2010. In 2010, the consumption of electricity represented 24% of the total of final energy, which reveals the importance of this source of energy in Portugal. However, data from 2011 shows a 3% reduction in the consumption of electricity (which is still less than the overall 5% reduction seen in consumption of final energy).

FIGURE 1

Evolution of Primary Energy Consumption (Mtoe), Final Energy Consumption (Mtoe), Electricity Consumption (TWh) and Gross Domestic Product (10^6€ 2006)



Source: DGEG (Directorate General of Energy and Geology), INE (National Statistics Institute)

1.3 Evolution of the Main Energy Indicators

The energy policy of the programme of the XIX Constitutional Government aims to reduce Portugal's energy dependence by diversifying primary sources of energy and increasing the nation's energy efficiency, keeping in mind the balance of payments, the respective relative costs and the national added value of each of these choices. In a context of environmental and territorial sustainability it is thus important to increase energy efficiency in order to reduce energy consumption and simultaneously increase the contribution of indigenous renewable energy sources (hydro, wind, solar, geothermal, biomass) in an economically rational manner so as to reduce Portugal's energy dependence in overall terms.

Energy dependence and energy intensity indicators are used to measure the progress of energy measures. With regard to the former, the absence of indigenous fossil energy resources results in a high level of energy dependence on external sources in terms of

primary energy, corresponding to 81.2% in 2009, with a sharp decline in 2010, to 76.7%, due to the emphasis on renewable energy, especially hydropower and wind energy, and on energy efficiency. However, data from 2011 indicated a rise in energy dependence to 79.0%, due to a reduction in hydro resources and the consequent increase in imports of about 1.2%, especially of coal and electricity.

The energy intensity indicator (national energy consumption as compared to wealth generated) makes it possible to juxtapose economic development and associated energy consumption. It has been observed that the energy intensity of primary energy has been decreasing substantially in recent years, aligning with the European Union average.

However, the positive value of the energy intensity of primary energy masks a less positive result when the energy intensity of final energy is measured. In reality, Portugal's substantial investment in technologies which exploit RES and a reduced energy consumption in the residential sector, as compared to the rest of Europe, disguise an energy intensity of the productive economy which is 27% higher than the European Union average. In other words, the national productive economy needs about 27% more energy to produce the same €1 of wealth. This fact reveals a serious problem in terms of the national economy's competitiveness, especially in a context of a significant increase in energy prices, which has reinforced the need to intensify efforts to act directly with regard to final energy, within the scope of the NEEAP, particularly of the productive economy, as opposed to a greater level of investment in the supply system, without jeopardising the necessary compliance with the goals of incorporating renewable energy, within the scope of the NREAP.

2. Integrated Review, Common Lines and Main Targets to be Achieved by the NEEAP 2016 and by the NREAP 2020

2.1 Integration of the Plans, Accompanying and Monitoring

The integration of the two Plans, which until now have been treated independently, will allow concerted action so as to comply with national and European objectives, minimising the investment necessary and increasing national competitiveness.

It was decided to carry out an integrated review of the NEEAP and the NREAP, with a view to promoting synergies which will make it possible to maximise the use of scarce human and financial resources, in an unfavourable macroeconomic environment, marked by intense funding limitations and a widespread reduction in the consumption of energy. This review also aims to facilitate decision-making processes, especially those which involve choices between investing in energy efficiency or in promoting the use of renewable energy. The main purpose of the revision is to align the respective objectives according to the consumption of primary energy and the necessary contribution of the energy sector to reduce greenhouse gas emissions.

In this context, the implementation of the NEEAP 2016 and the NREAP 2020 must benefit from a common structure to accompany and monitor the evolution and the results of the measures and actions developed in each Plan. It is equally essential to incorporate them into the structure used to accompany and monitor the PNAC 2020, making it possible to obtain the necessary information to assess national commitments in the areas of energy and climate.

To this end, the organisation of the NEEAP management model will be reviewed, which is currently defined in Decree-Law No 50/2010 of 20 May 2010 and in Order No 1316/2010 of 28 December 2010. As for the NREAP, an organisational model will be developed for managing this Plan, which will be incorporated within the NEEAP management structure.

With regard to NREAP 2020, the plans and programmes stipulated therein for the energy sector are subject to a strategic environmental assessment whenever necessary pursuant to applicable legislation.

Cooperation agreements and protocols will also be promoted with private entities to share responsibilities for implementing and managing programmes (e.g. energy producer associations, traders and distributors, municipalities).

2.2 Common Lines

In this context, the main common lines in terms of reviewing the NEEAP and NREAP are as follows:

a) Aligning the objectives of the Plans according to the consumption of primary energy;

b) Eliminating measures which are difficult to implement or quantify or which have a limited impact and substituting them with new measures or reinforcing existing measures which cost less and are easier to implement;

c) Structured assessment of the impact of the measures propounded by each Plan; and

d) Instituting a joint system for accompanying and monitoring the Plans.

2.3 Targets

The revised targets of the NEEAP and the NREAP aim to:

a) Comply with all of Portugal’s commitments in an economically more rational manner;

b) Significantly reduce greenhouse gas emissions, in a context of sustainability;

c) Reinforce the diversification of primary energy sources, contributing towards structurally increasing national supply security;

d) Increase the economy’s energy efficiency, particularly that of the State sector, contributing towards a reduction of public expenditure and the efficient use of resources;

e) Contribute towards increasing the economy’s competitiveness, by reducing the consumption and costs associated with the operation of companies and the management of the domestic economy, freeing resources to promote internal demand and new investment.

The aim is thus to chalk out a sustainable strategy to promote energy efficiency and explore renewable energy in Portugal, contributing towards a competitive and low carbon economy, in light of the economic and technological panorama which will define the next decade. These measures must be supported within a regulatory framework which makes it feasible to successfully implement these actions in a realistic and pragmatic manner.

PART I

Energy Efficiency Strategy – NEEAP 2016

1. Framework and Objectives

The definition of a new Energy Efficiency Strategy aims to ensure that energy efficiency is a priority in terms of the energy policy, keeping in mind that, to date, Portugal does not have its own indigenous sources of fossil fuels nor a sufficient volume of primary energy purchases to influence market prices (price taker). Moreover, improvements in energy efficiency promote environmental protection and energy security with a favourable cost-benefit ratio.

The initial objective of the energy efficiency action plans of the various Member States was to reduce annually, up to 2016, the equivalent of 1% of the average final energy consumption in 2001-2005. In light of European Parliament and Council Directive No 2012/27/EU of 25 October 2012 on energy efficiency (New Energy Efficiency Directive), the objective was redefined in terms of a maximum limit for the consumption of primary energy in 2020 (based on PRIMES forecasts carried out in 2007) equivalent to a reduction of 20% (24.0 Mtoe, excluding non-energy uses). The economic recession has significantly changed the national patterns of primary energy consumption and expected evolution by 2020 and, considering an optimistic scenario for the installation of RES potential, compliance with the objective is now deemed to be an expected consumption of 23.8 Mtoe. The Government's new objective of a 25% reduction (maximum consumption limit of ~22.5 Mtoe) will require an additional effort to reduce primary energy consumption by a further 1.2 to 1.7 Mtoe.

With a view to making suitable adjustments according to the new objectives defined, an analysis was carried out of the potential impact and economic feasibility of the NEEAP approved by Council of Ministers Resolution No 80/2008 of 20 May 2008 (NEEAP 2008), to implement the general goal of a 25% reduction and the specific goal for the State to achieve a 30% reduction in primary energy consumption by 2020. In the current environment, it was deemed to be necessary to adjust the objectives of the NEEAP 2008 to the current national economic setting, considering the sources and the level of funding available, reducing the financial incentives in light of the strict need to comply with the goals and selecting the measures on the basis of a graded cost-benefit ratio associated with the respective investments.

To this end, an analysis of the (current and potential) estimated impact was carried out of all the measures stipulated in the NEEAP 2008, in accordance with European norms on monitoring energy efficiency plans and measures. As a result, it was decided to

continue the majority of the measures envisaged in the NEEAP 2008 in the NEEAP 2016, although some of them were changed in terms of the respective goals or the inclusion or exclusion of some of their actions, according to their current state of and potential for implementation as compared to the respective economic cost. Measures which had not yet been implemented or were difficult to quantify or had a limited impact were also eliminated and have been substituted with new measures or existing measures which cost less and are easier to implement have been reinforced, so as to maximise the probability of complying with the goals which have been defined (e.g. regulatory changes, energy performance agreements and agreements to distribute benefits, measures for proven cost reduction based on MWh avoided and tested behavioural measures).

Measures contained in the new European Directives and guidelines have also been implemented – European Parliament and Council Directive No 2009/125/EC of 21 October 2009 on establishing a framework for the setting of ecodesign requirements for energy-related products (Ecodesign Directive), European Parliament and Council Directive No 2010/31/EC of 19 May 2010 on the energy performance of buildings (New Building Energy Performance Directive), with a special emphasis on the Public Administration, and Commission Communiqué 'Intelligent Networks: From Innovation to Implantation' of 12 April 2011 (Intelligent Networks Communiqué).

The main objective of the NEEAP 2016 is thus to plan new actions and targets for 2016, in articulation with the NREAP 2020, integrating the concerns on the reduction of primary energy for the 2020 time frame contained in the New Energy Efficiency Directive, based on three lines of intervention:

i) Action, by suitably adjusting the measures to the current economic and financial context, with a view to reducing the overall cost of the national energy efficiency programme;

ii) Monitoring, by revising the methods for monitoring results in compliance with European directives and creating a macro vision of the impact of the national energy efficiency programme; and

iii) Governance, by redefining the NEEAP's governance model.

In terms of monitoring results, the methodologies for calculating the bottom-up indicators have been redefined, with a view to suitably identifying the direct impact of each measure, excluding indirect impact and aligning the measuring and verification mechanisms with current European directives.

Apart from the existing monitoring methodology (bottom-up analysis of measures), and in keeping with European recommendations (Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC), it was necessary to introduce complementary top-down indicators which make it possible to assess the Plan from the perspective of the general evolution of the primary consumption of energy (macro vision of the impact of the energy efficiency programme), facilitating follow-up and assessments and confirming time bound lines of action.

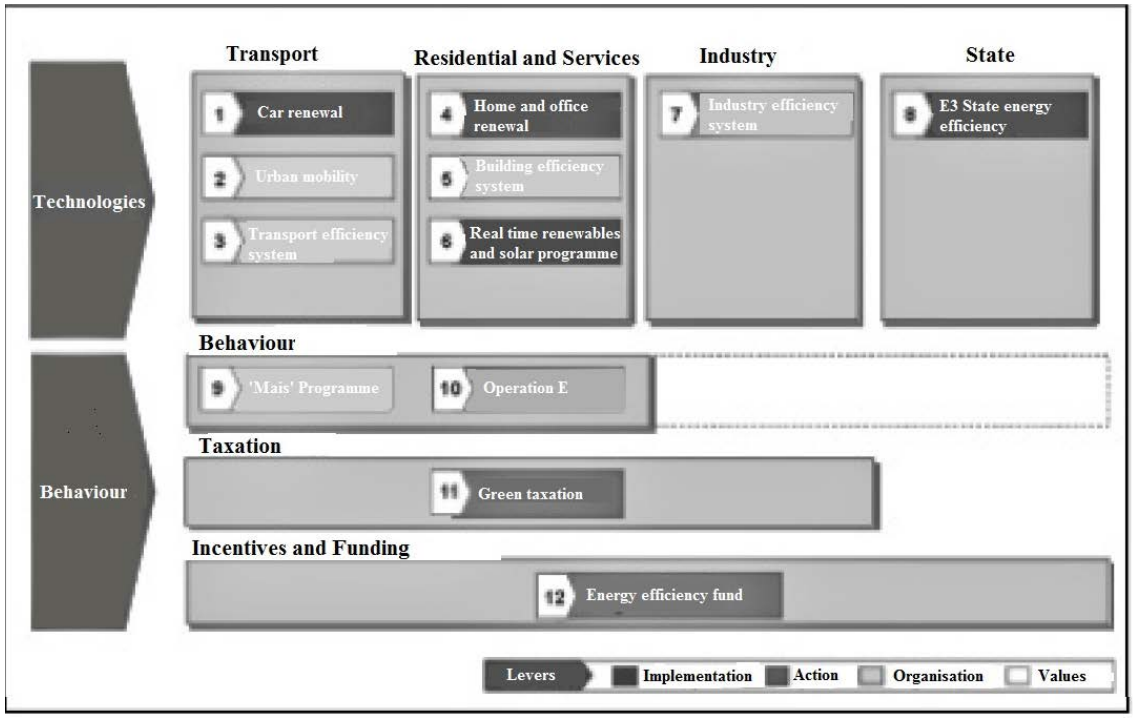
With regard to the governance model, it is necessary to revise the management structure of the NEEAP and to redefine the functions of the different entities in implementing and monitoring the measures stipulated in the NEEAP, as well as to implement the Energy Efficiency Fund (EEF) and consolidate it with the other programmes aimed at supporting energy efficiency, so as to optimise the incentives.

The complete implementation of the NEEAP 2016 will promote compliance with this Plan's objectives as well as with the objectives of the NREAP 2020, namely, incorporating 31% of RES in the final gross energy consumption and 10% of RES in the Transport sector. This potential impact on compliance with the goals demonstrates the need for constant monitoring and a continuous assessment of the Plan.

2. Analysing the Impact of the NEEAP 2008

The NEEAP 2008 established a goal of reducing final energy consumption by 10% by 2015. Fifty measures were defined to achieve this goal, organised into 12 programmes, with a view to reducing energy consumption in the areas of Transport, Residential & Services, Industry, State and Behaviour.

Original NEEAP Programme (2008)



The ENE 2020, approved by Council of Ministers Resolution No 29/2010 of 15 April 2010, later defined a goal of reducing final energy consumption by 20% by 2020.

The XIX Constitutional Government defined a more ambitious goal, corresponding to a 25% reduction in primary energy consumption by 2020.

An analysis of the (current and potential) estimated impact of the measures stipulated in the NEEAP 2008 was carried out in accordance with European norms on monitoring

energy efficiency plans and measures (Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC). The impact was measured on the basis of calculation methods used in the respective preparation and in accordance with the redefined calculation methods for the bottom-up indicators, with a view to suitably identifying the direct impact of each measure.

This analysis contemplated savings which had already been generated until 2010. Keeping in mind that the new goal for 2016 is of 1 501 305 toe, the implementation of the NEEAP 2008 made it possible to achieve 49% of the objective by 2010 in cumulative terms.

The energy savings of the measures contained in the NEEAP 2008, in the specific areas of Transport, Residential & Services, Industry and State and the transversal area of Behaviour, were based on the reference scenario of the average national final energy consumption in the period 2001-2005, as defined in European Parliament and Council Directive No 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services (Energy Efficiency Directive), as shown in the following table:

TABLE 1

Summary of total savings achieved with the NEEAP

Area	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
Transport	252 959	1 501 305	49%
Residential and services	267 008		
Industry	177 895		
State	9 902		
Behaviour	21 313		
NEEAP total	729 077		

2.1 Transport

The area of Transport in the NEEAP 2008 included the Car Renovation, Urban Mobility and Energy Efficiency System for Transport programmes. In this area, a reduction in energy consumption of about 252 959 toe was recorded between 2008 and 2010, which made it possible to achieve 74% of the target in cumulative terms.

2.1.1 Car Renewal

Results were achieved in five of the six measures of this programme. The results achieved for the measures T1M1 – Eliminating vehicles at the end of their useful life and T1M2 – Green Taxation – Revising the taxation system for private vehicles were especially worthy of note. With regard to measure T1M1, the impact achieved in the first quarter of 2011 was also considered. The measure T1M5 - Fuel Efficiency was

discontinued due to a decline in demand for more efficient fuels and lubricants as compared to the reference scenarios envisaged.

This fact did not allow this measure to have an economic return and it was therefore not implemented by the market.

TABLE 2

Savings achieved with the 'Car Renewal' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Car Renewal	T1M1 – Eliminating vehicles at the end of their useful life	52 848	116 730	85%
	T1M2 – Green Taxation – Revising the taxation system for private vehicles	40 017		
	T1M3 – Green tyre	2 061		
	T1M4 – Right pressure	1 565		
	T1M6 – New vehicles which are more 'aware' in relation to fuel saving	2 993		

2.1.2 Urban Mobility

The results achieved by 2010 in the context of the T2M1 – Modal Transfers in Lisbon, Porto and Other District Capitals measure are worthy of note, especially in terms of the increase in the use of metro systems (Porto metro, South Tagus surface metro and the expansion of the Lisbon metro network). The results achieved in this measure are related to the current macroeconomic scenario, a decline in consumption and a consequently higher demand for public transport.

The target set for 2016 for this measure was already achieved in 2010. Without prejudice to the effect of the current scenario, it is estimated that future monitoring could also have an additional impact on the potential for savings which has already been achieved.

Only two measures, T2M1 – Modal Transfers in Lisbon, Porto and District Capitals and T2M3 – Use of more energy efficient transport, had an impact on energy consumption in the period in question (2008 to 2010). Measure T2M2 – Mobility Plans was begun in 2009 and integrated into the measure Promoting Mobility for the purposes of the 2016 NEEAP, since both aim to achieve the same target. No progress was made with regard to measure T2M4 – Traffic Management Platform in Large Urban Centres, which shows that the resources invested in this measure were not suitable for the current state of the economy and that it was not efficient to maintain the measure in this format, due to which it has been withdrawn.

The T2M3 measure also considered the impact observed until 2011 of a new measure related to the Management of Taxi Fleets.

TABLE 3

Savings achieved with the 'Urban mobility' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Urban mobility	T2M1 – Promoting sustainable mobility and adopting best practices	98 817	128 003	82%
	T2M3 – Use of more energy efficient transport and mobility solutions	6 114		

2.1.3 Transport Energy Efficiency System

This programme witnessed a significant delay in the T3M1 - Portugal Logistics and T3M2 – Ocean Highways measures and they were therefore withdrawn in the 2016 NEEAP.

Of all the measures of this programme only T3M3 – Restructuring Railway Products had some impact during the 2008-2010 period.

TABLE 4

Savings achieved with the 'Transport Efficiency System' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Transport Efficiency System	T3M3 – Free Passenger Rail Transport	45 659	99 305	49%
	T3M4 – Transport Energy Consumption Management Regulations	2 885		

2.2 Residential and Services

The Residential & Services area of the 2008 NEEAP encompassed the *Home & Office Renewal, Building Energy Efficiency System, Express Renewables* and the *Solar Programme* measures.

A reduction in energy consumption of about 267 008 toe was recorded in this area between 2008 and 2010, which, in cumulative terms, made it possible to achieve 42% of the target set.

2.2.1 Home & Office Renovation

This programme achieved a performance which was far higher than the objective stipulated as the cumulative target for 2010.

This result was mainly due to the successful implementation of measures to substitute inefficient equipment. The results of the R&S4M3 - Phase-out of Incandescent Bulbs measure are especially worthy of note. This measure resulted in the introduction of about 15 million compact fluorescent lamps (CFL) in the national lighting system, by means of national programmes aimed at substituting inefficient bulbs as well as by changing the behaviour of consumers to buy equipment with a high energy performance level (refrigerators, freezers and washing machines), within the scope of the R&S4M1 and R&S4M2 measures.

In the first quantification of the impact of the remodelling measures R&S4M5 – Efficient Glazing, R&S4M6 – Efficient Insulation and R&S4M7 – Green Heating, the figures showed a relevant impact, especially the Green Heating measure, which was due to dynamism in the market for heat recuperators used for heating purposes.

TABLE 5

Savings achieved with the 'Home and Office Renewal' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Home and Office Renewal	R&S4M1 AND R&S4M2 – Promotion of more efficient equipment	99 931	399 913	41%
	R&S4M3 – Efficient lighting	48 530		
	R&S4M5 – Efficient window	311		
	R&S4M6 – Efficient insulation	435		
	R&S4M7 – Green heat	15 796		

2.2.2 Energy Efficiency System for Buildings

This programme aims to improve the energy performance of buildings, by improving the average energy efficiency class in built up areas. This is to be achieved by implementing the guidelines regulating the National Building Energy Certification and Internal Air Quality System (SCE), approved by Decree-Law No 78/2006 of 4 April 2006, which partially transposed to the national legal system European Parliament Directive No 2002/91/EC of 16 December 2002 on the energy performance of buildings. This system is currently being changed due to the transposition of the New Energy Performance of Buildings Directive.

The evolution observed in the Building Energy Efficiency System Programme reflects continuity in terms of issuing energy certification and declarations of regulatory compliance within the ECS and reassesses energy savings per building, based on a sample of almost 400 000 certificates in 2010.

TABLE 6

Savings achieved with the 'Building Energy Efficiency System' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Energy Efficiency System for Buildings	R&S5M1 – SCE Residential Buildings	57 473	160 745	50%
	R&S5M2 – SCE Service Buildings	23 697		

2.2.3 Express Renewables and the Solar Programme

This programme aimed to promote the substitution of energy consumption from fossil sources by energy from renewable sources, by easier access to micro-generation technologies for electricity and heating hot water by solar energy.

The programme had dynamic results in terms of the two measures defined for electricity micro-production, as well as the incentives for installing new solar heating systems.

The R&S6M1 – Micro-production measure, which has now been discontinued within the scope of this Plan due to the lack of an impact on final energy, resulted in twelve thousand micro-producers joining the programme during the first three years.

The R&S6M2 – Solar Heating measure had a significant impact as a result of the strong impetus provided by means of the 'Solar Heating Programme 2009' initiative, which created a framework of incentives for purchasing equipment to heat hot water in the residential segment. This initiative was later extended to Private Social Solidarity Institutions (IPSS) and Public Utility Sports Associations (ADUP).

TABLE 7

Savings achieved with the 'Express Renewables' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Express Renewables	R&S6M2 –Solar Thermal Residential	16 303	73 607	28%
	R&S6M2 –Solar Thermal Services	4 532		

2.3 Industry

The area of Industry in the NEEAP 2008 covered the Energy Efficiency System for Industry programme. A reduction in energy consumption of about 177 895 toe was recorded in this area between 2008 and 2010, which made it possible to achieve 49% of the set target in cumulative terms.

2.3.1 Energy Efficiency System for Industry

The progress made in terms of the I7M1 – Transversal Measures, I7M2 – Specific Measures and I7M3 – Other Sectors of Activity measures resulted in the delivery of almost 400 energy consumption rationalisation plans, within the scope of the Intensive Energy Consumption Management System (SGCIE).

The calculation of the impact of these measures considered the impact of the savings measures framed within the Energy Consumption Rationalisation Plans (PREN), submitted to the Directorate-General for Energy and Geology (DGEG), within the scope of the SGCIE, by the end of 2010, and the impact of the measures to promote energy savings which are still being implemented within the scope of the previous Regulations for Managing Energy Consumption (RGCE) (repealed by Decree-Law No 71/2008 of 15 April 2008, which approved the SGCIE), resulting from measures implemented after prior energy audits.

The results of the I7M1, I7M2 and I7M3 measures fell short of the objective, since the approved plans were still in the early phase of their implementation. This was one of the reasons which resulted in the current review of the SGCIE.

TABLE 8

Savings achieved with the 'Industrial Energy Efficiency System' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Industrial Energy Efficiency System	I7M1 – SGCIE – Transversal measures	16 093	365 309	49%
	I7M2 – SGCIE – Specific measures	3 693		
	I7M3 – SGCIE – Other sectors	22 800		
	I7M4 – Retroactive measures	135 309		

2.4 State

The area of the State in the NEEAP 2008 covered the State's Energy Efficiency programme. A reduction in energy consumption of about 9 902 toe was observed in this area between 2008 and 2010, which made it possible to achieve 9% of the set target in cumulative terms.

2.4.1 The State's Energy Efficiency

The results achieved by means of this programme were essentially obtained by means of the positive performance of E8M1 – Energy Certification of State Buildings and the measures related to Efficient Public Lighting, particularly the E8M8 – Installation of Flux Regulators, E8M11 – Phase-Out of Mercury Vapour Lamps and E8M13 – Traffic Control Systems (LED technology at traffic lights) measures.

The E8M2 – Solar Heated Swimming Pools and E8M3 – Solar Heated Sports Arenas measures achieved some positive results, boosted by the systems of incentives and a significant awareness campaign.

The effect of the E8M6 – Renewal of the fleet with low emissions vehicles measure was included in the calculations for the first time in 2010 due to the acquisition of more efficient vehicles.

TABLE 9

Savings achieved with the 'State Energy Efficiency' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
State Energy Efficiency	E8M1 – Energy Certification of State Buildings and ECO.AP	4 769	106 380	9%
	E8M2 AND E8M3 – Energy efficiency action plans in public administration - ECO.AP	1 016		
	E8M6 – More efficient State transport	165		
	E8M8 TO E8M13 – Efficient public lighting	3 952		

2.5 Behaviour

The area of Behaviour in the NEEAP 2008 included the 'More Programme' and 'Operation E' programmes. A reduction in energy consumption of about 21 313 toe was recorded in this area between 2008 and 2010, which made it possible to achieve 100% of the set goal, in cumulative terms. It is believed that future monitoring could also have an added impact on the potential savings already achieved.

2.5.1 Operation E

The set of measures known as 'Programme E, now known as 'Communicate Energy Efficiency' aim to increase awareness about the importance of energy efficiency, by inducing a change in behavioural aspects related to the end use of energy. In this regard initiatives such as the 'Solar Heating Campaign 2009', the Market Study 'Behavioural Changes with regard to Energy Efficiency' and the implementation of the 'Portugal Efficiency Barometer 2010' in companies are worthy of note.

Results were also achieved in C10M3 – Energy at Home and C10M4 – Energy at Work measures.

TABLE 10

Savings achieved with the 'Communicate Energy Efficiency' programme

Programme	Measure	Energy saved (toe)	Target 2016 (toe)	Execution in relation to 2016 target
		Final	Final	
Communicate Energy Efficiency	C10M1 – Energy in Schools	0	21 313	100%
	C10M2 – Energy in Transport	0		
	C10M3 – Energy at Home	19 489		
	C10M4 – Energy at Work	1 824		

3. NEEAP 2016 Areas, Programmes and Measures

Based on the areas, programmes and measures of the NEEAP 2008, the NEEAP 2016 will cover six specific areas: Transport, Residential & Services, Industry, State, Behaviour and Agriculture. These areas include a total of 10 programmes, incorporating a range of measures to improve energy efficiency, targeting demand for energy, which aim to achieve the proposed objectives in a manner which is quantifiable and can be monitored.

TABLE 11

NEEAP 2016 Areas and Programmes

	AREAS					
	Transport	Residential and Services	Industry	State	Behaviour	Agriculture
PROGRAMMES	Eco Car	Home and Office Renovation	Intensive Energy Consumption Management System	State Energy Efficiency	Communicate Energy Efficiency	Efficiency in the agricultural sector
	Urban Mobility	Building Energy Efficiency System				
	Transport Energy Efficiency System	Solar Thermal				

The area of Transport encompasses the following programmes to improve energy efficiency:

a) Eco Car, which includes measures aimed at improving the energy efficiency of vehicles;

b) Urban Mobility, which includes measures related to the need to encourage the use of public transport and soft modes of transport to the detriment of individual motor transport, with a particular emphasis on urban areas;

c) Energy Efficiency System for Transport, which includes measures aimed at dynamising the use of passenger railway systems, as well as the energy management of transport fleets.

The Residential & Services area encompasses the following programmes for improving energy efficiency:

a) House and Office Renovation, which includes a set of measures aimed at promoting energy efficiency in terms of lighting, home appliances and the rehabilitation of spaces;

b) Energy Efficiency System for Buildings, which includes the measures derived from the process of energy certification for buildings;

c) Integration of Sources of Renewable Thermal Energy/Solar Thermal Energy, which includes measures aimed at promoting a greater integration of sources of renewable energy in buildings and residential and service infrastructure.

The area of Industry is reflected in a programme entitled *Energy Efficiency System for Industry*, which includes a revision of the SGCIE. The transversal measures in the industrial sector and other sectoral measures continue to play an important role in terms of efficiency in industrial processes.

The area of the State includes a programme entitled *State Energy Efficiency*, with a set of measures aimed at the energy certification of State buildings, along with Energy Efficiency Action Plans, especially within the scope of the Public Administration Energy Efficiency Programme - ECO.AP, State transport fleets and Public Lighting.

The area of Agriculture includes a programme entitled *Energy Efficiency in the Agriculture Sector* which aims to group together and promote actions carried out in this area with a view to reducing energy consumption.

The area of Behaviour includes measures aimed at promoting energy efficient consumer habits and attitudes, such as recommending efficient products, by means of communications and awareness campaigns.

These measures aim to dynamise the opportunities for energy efficiency in all the areas encompassed by the NEEAP. Since it is more difficult to monitor and quantify, the respective contribution is in addition to the goal established for the NEEAP 2016.

The NEEAP envisages inducing a savings of 8.2%, close to the indicative goal defined by the European Union of 9% of energy savings by 2016, with a reduction in energy consumption being distributed over various sectors of activity, as can be seen in the following table:

TABLE 12

Summary of NEEAP 2016 impacts per programme

Programme	Potential Savings (toe)	%	Target 2016 (toe)
Transport	344 038	23%	1 501 305
Residential and Services	634 265	42%	
Industry	365 309	24%	
State	106 380	7%	
Behaviour	21 313	1%	
Agriculture	30 000	2%	

3.1 Transport

This area consists of three programmes: i) Eco Car (Tp1), to promote energy efficiency for private transport; ii) Urban Mobility (Tp2), to promote the use of public transport; and iii) Energy Efficiency System for Transport (Tp3), to promote the energy efficiency of passenger and goods transport operators.

Keeping in mind the need to create an effective system to monitor the evolution of specific indicators for each measure (bottom-up), which would also make it possible to assess other macroeconomic effects which are not directly associated with the measures listed, it was decided to assess and monitor the implementation of the programme measures in an aggregate manner by means of top-down indicators. This does not prevent the monitoring from being done by both types of indicators.

3.1.1 Programmes and Measures

Programme Tp1 – Eco Car

This programme consists of three measures to promote improvements in the private transport segment, encouraging a more efficient use and replacements of vehicles.

Tp1m1 – Green Taxes – Revising the taxation system for private vehicles

This measure aims to maintain and improve existing conditions with a view to promoting the introduction of automobiles with low CO_2 emissions through instruments and mechanisms encouraging their dissemination in the road transport sector. Some of the instruments used to implement this measure are related to reformulating vehicle taxes, as well as providing consumption guides and publicising the energy information of new vehicles.

This measure is in keeping with the Community strategy, which is essentially based on three aspects: i) voluntary commitments by the automobile industry to reduce greenhouse gases; ii) better information for consumers and iii) promoting more efficient automobiles in terms of energy consumption, by means of fiscal measures.

Emissions are linked to the quality of the fuels, but largely depend on the efficient use of fuels, especially the technology of combustion motors. This measure aims to encourage the acquisition of private and commercial light vehicles with lower emissions.

The main instruments to achieve this measure are of a fiscal nature, with different rates of vehicle taxes (ISV) and road tax (IUC) for registered automobiles and mopeds, based on the level of gCO_2/vkm emissions. The ISV is calculated after considering the CO_2 emissions, based on progressive tables, with a view to encouraging the acquisition of vehicles with lower emissions. These instruments also serve the purpose of informing consumers by constituting an economic incentive associated with a choice involving a lower and more rational fuel consumption and therefore a less polluting vehicle.

Tp1m2 – Green Tyres

This measure aims to increase the introduction of energy efficient tyres – tyres with low rolling resistance (RR) and to reduce the number of cars on the roads with incorrect tyre pressure. This measure will continue the measures included in the NEEAP 2008, especially the following:

Tp1m2 -1 – Green Tyres (Efficient Tyres)

It is estimated that the savings from this measure will result in an average consumption saving for vehicles of between 1% to 2%. An efficient tyre can have half the Rolling Resistance (RR) coefficient of an inefficient tyre, wherein the variation in a car can range from an RR of 0.014 (less efficient) to 0.007 (more efficient).

European Parliament and Council Regulation No 1222/2009 of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters, which made it obligatory to label tyres from November 2012 onwards, is likely to promote an increase in sales of efficient tyres, in light of a scenario of better quality information being provided on the benefits of using such tyres, especially those related to a lower fuel consumption and increased vehicle safety.

In addition to said obligations for tyre manufacturers, campaigns will be developed to promote the advantages of using more efficient and safer tyres, which have lower noise levels, to be developed by the State in partnership with tyre manufacturers and tyre sector associations.

Tp1m2 -2 – Green Tyres (Correct Pressure)

This measure aims to reduce the number of cars on the roads with incorrect tyre pressure.

It is estimated that a large number of vehicles have incorrect levels of tyre pressure, varying between 0.4 and 0.5 bars. This results in additional consumption of between 1% and 2.5%.

The promotion tools shall continue to include, essentially, awareness campaigns on correct pressure and tyre calibration and encouraging periodic checks of tyre pressure, making it compulsory at the Obligatory Periodic Inspection (IPO) centres as well as at other verification points.

Tp1m3 - Mobi.E: Promoting the acquisition of Electric Vehicles (EV)

This measure aims to promote demand for and introduce electric vehicles (EV) in the light mixed and passenger market as well as electric scooters, making the most of the investments which have already been made to develop an intelligent and integrated platform. One of the possible solutions could include adjusting the existing charging infrastructure, adapting them to public and private covered parking sites, namely by developing domestic charging solutions. Another aspect of this measure will focus on demonstrating the advantages of using electric vehicles and scooters, highlighting the benefits of this technology as compared to the growing costs associated with conventional fuels and the environmental impact.

In a similar manner to the Green Taxes measure, electric vehicles have tax benefits, *viz*. total exemption of the environmental component of the IUC road tax and purchases can access benefits in terms of the ISV, pursuant to Article 2(2)(a) of Annex I of the Vehicular Tax Code, approved by Law No 22 -A/2007 of 29 June 2007, in its present form.

RESULTS

TABLE 13

Impact of the 'Eco Car' programme on NEEAP 2016

Programme Tp1		Final energy	Primary energy
Results	Energy saved (toe)	43 643	43 643
Targets	Target to 2016 (toe)	60 889	60 534
	Execution with regard to 2016	72%	
	Target to 2020 (toe)	83 372	81 773
	Execution with regard to 2020		53%

Programme Tp2 – Urban Mobility

This programme consists of two measures and aims to encourage the use of public transport and soft modes of transport to the detriment of individual transport, with a special emphasis on urban areas.

Tp2m1 – Promoting sustainable mobility and adopting best practices

This measure aims to encourage the use of public transport instead of individual transport, focusing especially on urban areas.

The development of public transport infrastructure, associated with greater supply and better services, has proved to be a catalyst to attracting a larger number of users. This development must be combined with efforts to improve the planning and management of mobility, which, together with the implementation of measures restricting the circulation and parking of private vehicles, will contribute towards promoting greater use of public transport and soft modes of mobility.

The nation's current economic situation and the continuous increase in fuel prices have a negative impact on disposable income and are expected to continue to condition mobility options, resulting in greater demand for public transport. However, it will be necessary to monitor the impact that increases in the prices of tickets and passes will have on the evolution of demand and, according to this evolution, frame policies to encourage the use of public transport.

The 'Mobility Package' presented by the Mobility and Land Transport Institute (*Instituto da Mobilidade e dos Transportes Terrestres, I.P.* - IMTT, I.P.) in 2011 provided municipalities, business hubs and entities managing infrastructure which generate and attract travel a tool to support their mobility policies and strategies. It is expected that it will be progressively possible to ascertain the savings generated, namely by implementing mobility and transport plans at a municipal and regional level and measures to manage mobility in companies and hubs.

The growing awareness about issues involving spatial planning, development and the management of public spaces is also expected to contribute towards greater energy efficiency, as will the adoption of measures to regulate traffic, promote paid urban parking policies and solutions working in harmony with collective transport.

It is also expected that the progressive effectiveness of checks ensuring compliance with the maximum speed limits resulting from technological systems and solutions will also contribute towards energy efficiency.

Keeping in mind that it is difficult to monitor the impact of this measure, it was decided to quantify only the impact identified up to 2010 and to later carry out top-down analyses which could identify the additional impact on the potential savings which could be achieved by this Plan.

Tp2m2 – Use of more energy efficient transport and mobility solutions

This measure aims to improve energy efficiency by introducing more efficient vehicles for public road transport, as below:

Tp2m2 -1 Minibuses and flexible transport services

To encourage the use of fleets of minibuses which, either individually or as part of a fleet of conventional size buses, can better satisfy demand during off-peak hours for urban public transport fleets or in rural areas with a low demographic density.

Innovative solutions will also be implemented which make it possible to respond to the population's mobility needs by means of flexible public transport services (FPT), translating into services with variable itineraries, stops and schedules.

These initiatives will make it possible to provide public transport solutions which are better suited to demand, improving performance levels (reduction of consumption, routes and distances) and reducing the use of individual transport.

Tp2m2 -2 - Central management of fleets and automatic allocation of taxi services

Taxis are an intermediate solution between public transport and private vehicles, making it possible to respond in a more suitable manner to specific transport needs.

This measure contemplates new solutions for organising and providing taxi services, which can include integrating them into the FPT modality.

This measure also focuses on developing central units to manage fleets and to automatically allocate taxi services, which makes to possible to locate all vehicles and ascertain whether they are available, encouraging available taxis to wait for fares at taxi stands, significantly reducing the services captured while circulating.

The reduction of empty journeys will have an immediate effect of reducing the respective fuel consumption, traffic congestion, vehicle maintenance expenditure, emissions, etc.

Tp2m2 -3 Use of bicycles and soft modes of transport

A schedule of actions was chalked out after preparing the 'Plan to Promote Bicycles and Other Soft Modes of Transport – 2013-2020', with a view to developing a strategy and a coherent and articulated set of measures to promote the everyday use of bicycles and to adopt sustainable mobility solutions. This also entails creating better and safer conditions for soft modes of transport and changes in behaviour so as to promote a reduction in the use of individual motorised transport.

Apart from the leisure and sports aspect, reinforcing the everyday use of bicycles is likewise associated with the growing number of municipalities which have been implementing bike sharing solutions and creating networks of cycle tracks (greater availability, cycle lanes and cycle tracks). The objective is to offer infrastructure to support the 'Plan to Promote Bicycles and Other Soft Modes of Transport – 2013-2020' and sports and leisure activities, along with infrastructure aimed at promoting the everyday use of bicycles by creating links between residential areas, employment and service zones and major infrastructure.

It must be emphasised that much of the investment made in networks of cycle tracks has been at the initiative of municipalities.

The recent conclusion of the 'Plan to Promote Bicycles and other Soft Modes of Transport – 2013-2020' and the government initiative to constitute a Mission Unit to prepare the 'Light Mobility Charter' will promote a growing use of soft modes of transport, creating conditions to increase their share in modes of transport within the framework of the NEEAP.

RESULTS

TABLE 14

Impact of the 'Urban mobility' programme on NEEAP 2016

Programme Tp2		Final energy	Primary energy
Results	Energy saved (toe)	104 931	104 931
Targets	Target to 2016 (toe)	128 003	128 003
	Execution with regard to 2016	*82%*	
	Target to 2020 (toe)	157 421	157 421
	Execution with regard to 2020		*67%*

Programme Tp3 – Energy Efficiency System for Transport

This programme consists of four measures and aims to encourage actions to improve the services of passenger railway networks as well as to manage the energy consumption of transport fleets.

Tp3m1 – Passenger Railway Transport Services

This measure was part of the National Plan for Climate Change, approved by Council of Ministers Resolution No 104/2006 of 23 August 2006 (PNAC 2006) and aimed to change the services of the railway concessionaire (CP - *Comboios de Portugal*) by reducing the travel time between Lisbon-Porto, Lisbon-Castelo Branco and Lisbon-Algarve. The activities carried out within the scope of this measure were related to the efficiency of operations, improved quality of service, reduction in travel times and increased demand.

Since this is a measure with already discernable results and potential for further growth, maintaining this measure and its impact up to 2016 was considered to be a strategic and fundamental option.

However, the impact of this measure can be improved by actions promoted in partnership with passenger railway transport operators, highlighting the economic and environmental advantages of using trains instead of private vehicles, especially evident in the context of medium and long distance journeys.

Tp3m2 – Regulations for Managing Energy Consumption in the Transport Sector

This measure assesses the performance of the current Regulations for Managing Energy Consumption in the Transport Sector, approved by Order No 228/90 of 27 March 1990,

amended by Law No 7/2013 of 22 January 2013 and the respective impact in terms of reducing energy consumption in the transport sector.

The technical review of the Regulations for Managing Energy Consumption in the Transport Sector is being assessed and could have an impact on the transport sector in terms of post-2016 targets.

This is a regulatory measure aimed at dedicated operators of transport fleets and the transport fleets of companies which every year have a consumption above a reference level (the current regulations include all the fleets with annual consumption of more than 500 toe). Rationalisation plans are prepared on the basis of specific audits with a view to improving energy intensity or reducing specific consumption.

Tp3m3 – Support for installing equipment to fill nitrogen tyres

This measure essentially aims to promote the installation of nitrogen generating systems in the workshops of passenger and goods transport operators and in the workshops of private fleets (of private and municipal companies), giving priority to fleets of heavy vehicles.

In addition to other consequences (safety, comfort and the useful life of the tyres) driving with incorrect tyre pressure represents an increase in the vehicle's energy consumption and the resulting associated emissions.

One of the ways of effectively ensuring a reduction in the number of vehicles driving with an unsuitable tyre pressure is to assess the possibility of providing support to the workshops of transport companies and company fleets to acquire nitrogen generating systems to fill tyres. Public filling stations and repair and assistance workshops could be encompassed in a second phase.

In addition to other advantages, filling tyres with nitrogen minimises a loss of pressure. Regardless of whether or not drivers verify tyre pressure, the use of nitrogen ensures that the vehicle's tyre pressure is suitable over a longer period of time.

Tp3m4 – System to Manage fleets and promote eco-driving

This measure consists of encouraging passenger and goods transport operators to adopt systems to monitor the performance of professional drivers. This makes it possible to correct unsuitable driving habits, adopt best practices and provide tools for ongoing training for drivers. It also promotes technological solutions which are compatible with open operating systems, ensuring interoperability with devices available in the market, which assist driving and allow information to be compiled on the driving and the vehicle's performance.

This measure will be complemented with training in eco-driving based on the data compiled.

RESULTS

TABLE 15

Impact of the 'Energy Efficiency System for Transport' programme on NEEAP 2016

Programme Tp3		Final energy	Primary energy
Results	Energy saved (toe)	48 544	48 544
Targets	Target to 2016 (toe)	99 305	99 305
	Execution with regard to 2016	*49%*	
	Target to 2020 (toe)	111 780	111 780
	Execution with regard to 2020		*43%*

3.1.2 Summary of the Measures in the Transport Sector

TABLE 16

Impact of the Transport sector on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	primary	Final	Primary		Final	Primary	
Eco Car	Tp1m1	40 017	40 017	47 326	47 326	85%	54 055	54 055	74%
	Tp1m2-1	2 061	2 061	8 024	8 024	26%	16 082	16 082	13%
	Tp1m2-2	1 565	1 565	3 678	3 678	43%	5 158	5 158	30%
	Tp1m3	0	0	1 861	1 506	0%	8 077	6 478	0%
Urban mobility	Tp2m1	98 817	98 817	98 817	98 817	100%	98 817	98 817	100%
	Tp2m2-1	785	785	1 745	1 745	45%	2 617	2 617	30%
	Tp2m2-2	5 329	5 329	25 635	25 635	21%	53 208	53 208	10%
	Tp2m2-3	0	0	1 806	1 806	0%	2 779	2 779	0%
Transport Energy Efficiency System	Tp3m1	45 659	45 659	60 000	60 000	65%	60 000	60 000	65%
	Tp3m2	2 885	2 885	25 343	25 343	11%	25 343	25 343	11%
	Tp3m3	0	0	3 866	3 866	0%	6 282	6 282	0%
	Tp3m4	0	0	10 096	10 096	0%	20 155	20 155	0%
Measures already concluded		55 841	55 841	55 841	55 841	100%	55 841	55 841	100%
Total NEEAP		252 959	252 959	344 038	343 683	74%	408 414	406 815	62%

(1) With regard to final energy.

(2) With regard to primary energy.

3.2 Residential and Services

The Residential & Services area has 3 programmes:

i) Home & Office Renovation (RSp1); ii) Energy Efficiency System in Buildings (RSp2) and iii) Integration of Sources of Renewable Thermal Energy /Solar Thermal Energy (RSp3).

This is an extremely important area for the successful implementation of the NEEAP 2016, since in 2011 it represented around 28% of the final energy consumption in Portugal, of which 16.6% was in the Residential sector and 11.4% in the Services sector. The electricity component is very high, especially in the Services sector (in 2011 more than 73% corresponded to electricity consumption) and is also quite significant in the Residential sector (around 43% in 2011).

3.2.1 Programmes and Measures

Programme RSp1 - House & Office Renovation

This programme aims to promote the replacement of equipment in the Residential and Services sector, so as to make home appliances, electrical equipment and lighting more efficient, in keeping with technological progress promoted by producers and driven by the market's requirements to reduce the respective energy consumption.

Improvements for each group of equipment can be promoted by means of one instrument or a combination of diverse instruments.

These instruments essentially act at two levels: i) by means of measures to encourage the use of more energy efficient products; or ii) by means of measures to penalise or restrict the acquisition of certain products or even prohibiting the sale of and introduction into the market of equipment having an energy performance below stipulated levels.

These measures are based on the implementation of national legislation which transposed the Energy Labelling Directive (Directive No 2010/30/EU of 19 May 2010) and Ecological Label Directive (Ecodesign Directive) for home appliances and other products, Community regulations, voluntary certification systems for energy efficient equipment or mechanisms to discourage the acquisition of inefficient products, whenever more efficient alternatives exist in terms of energy consumption which do not result in an increased consumption of water.

Other mechanisms, such as information and awareness campaigns and the development and availability of devices to simulate energy consumption for products can also be considered.

Some mechanisms have already proven to be effective, such as providing information in the form of energy labels, indicating the energy performance classes of certain products, or restricting equipment from entering the market which does not comply with certain specifications, such as requirements related to a maximum level of annual energy consumption.

RSp1m1 – Promoting more efficient equipment

The main objective of this measure is to promote the replacement of home appliances and other electric equipment essentially used for domestic purposes, reducing the specific consumption of home appliances.

Energy labelling, introduced by means of Council Directive No 92/75/EEC of 22 September 1992, made it possible for consumers to be clearly informed about the characteristics and performance of the products they were purchasing. This Directive covered a broad range of equipment representing significant energy consumption, considering the total consumption of the residential sector, especially the consumption of electricity.

The products were initially classified as being between A (more efficient) and G (less efficient). However, in 2003, the classification of energy performance was expanded with the introduction of the A++ and A+ categories.

Directive No 2010/30/EU of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (Energy Labelling Directive) repealed said Council Directive No 92/75/EEC of 22 September 1992 and introduced a new energy label, with new categories (A+++ to D, for most equipment) and new criteria for their attribution.

New categories of devices were included, among which televisions are especially worthy of note.

The Energy Labelling Directive, transposed by Decree-Law No 63/2011 of 9 May 2011, is currently the main instrument for promoting the acquisition and use of more efficient home appliances and other electric equipment. It is a well known tool which consumers have accepted well, since it clearly provides information on energy efficiency and the performance of equipment available in the market.

In addition to monitoring and promoting the implementation of this Directive, Member States must also ensure suitable labelling for products by means of market inspections. Inspections of stores are a possible means of verifying compliance with labelling obligations by retail outlets.

The Energy Labelling Directive also entrusted the Commission with the task of defining, by means of Regulations, the aspects relating to the label and the product specifications of the products covered by the Directive.

Currently, the energy labelling in effect in Portugal includes the following products:

TABLE 17

Current energy labelling of equipment in Portugal

Equipment	In effect since:	Current energy classes
Fridges and Freezers	January 1995	A+++ / D
Clothes Dryers	April 1996	A / G
Washing Machines	April 1996	A+++ / D
Dishwashers	August 1999	A+++ / D
Electric Ovens	January 2003	A / G
Air Conditioning	February 2003	A / G
Televisions	November 2011	A / G

The NEEAP 2008 only encompassed domestic cooling devices and equipment for clothes, neglecting a substantial potential to reduce consumption in other equipment. In addition to the equipment listed in the table above, the NEEAP 2016 aims to include all new products which are subject to energy labelling during the period the Plan is in effect.

Moreover, European requirements relating to ecodesign, applicable to energy consuming products, are stipulated in the Ecodesign Directive, with a view to ensuring

the free circulation of these products in the internal market and contributing towards sustainable development, increasing energy efficiency and the level of environmental protection. This Directive, transposed by Decree–Law No 12/2011 of 24 January 2011, established minimum requirements with which products and services in the market must comply. Though this legislation is not immediately discernable among consumers it has, however, imposed limits for the energy performance categories available in the market.

Thus, by virtue of the Ecodesign Directive, only the following classes of energy efficiency are currently permitted in the market:

TABLE 18

Implications of the Ecodesign Directive on the Equipment Market

Equipment	In effect since:	Current energy classes
Fridges and Freezers	January 1995	A+
Clothes Dryers	April 1996	D (since 2013)
Washing Machines	April 1996	A
Dishwashers	August 1999	A
Electric Ovens	January 2003	G
Air Conditioning	February 2003	G
Televisions	November 2011	G

Finally, contingency measures have also been planned to discourage the acquisition of inefficient equipment by applying penalties for marketing products with a low energy efficiency, if the labelling information and minimum ecodesign requirements of the equipment is not sufficient to enable greater energy efficiency in certain product segments.

The implementation of this measure will also be supported by information and awareness campaigns among consumers and by the development of simulators which allow product comparisons. This will be made available on the NEEAP site which will be developed to monitor this Plan.

RESULTS

TABLE 19

Impact of the measure 'Promotion of more efficient equipment' on NEEAP 2016

Measure RSp1m1		Final energy	Primary energy
Results	Energy saved (toe)	99 931	156 869
Targets	Target to 2016 (toe)	189 363	297 257
	Execution with regard to 2016	*53%*	
	Target to 2020 (toe)	235 535	361 886
	Execution with regard to 2020		*43%*

Monitoring methodology (Bottom-Up)

TABLE 20

Variables considered in the follow up methodology for measure RSp1m1 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Equipment	P	Un.
V	Total consumption	E	Toe
V	Specific consumption	-	toe/ un.
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

EE (year t) = $\left(\frac{E\_(t-1)}{P\_(t-1)} - \frac{E\_t}{P\_t}\right) \times P\_t$

RSp1m2 – Efficient lighting

This measure aims to adopt national programmes to promote efficient lighting, renovating existing equipment by substituting lamps with low energy efficiency and respective phase-out.

Decree-Law No 18/2000 of 29 February 2000 sets out the rules for the energy labelling of electric bulbs for domestic use, transposing Directive No 98/11/EC of 17 January 1998 to the national legal system.

In a similar manner to home appliances, bulbs are also classified according to their energy efficiency, allowing consumers to have an idea of the respective consumption on the basis of expected use.

In addition to this information, there is also a mechanism favouring the use of more efficient bulbs, which is reflected in the application of a tax on bulbs with a low level of energy efficiency (Decree-Law No 108/2007 of 12 April 2007). This has contributed significantly towards accelerating the phasing-out of incandescent bulbs.

It is now important to expand this to other types of less efficient bulbs based on energy performance categories, namely by introducing new types of bulbs, with a view to encompassing other emerging technologies, such as light-emitting diodes (LED) or efficient halogens, in the respective lighting segment. It is expected that these bulbs will begin to replace bulbs used for signalling and other more common uses of incandescent bulbs and low efficiency halogens.

RESULTS

TABLE 21

Impact of the measure 'Efficient Lighting' on NEEAP 2016

Measure RSp1m2		Final energy	Primary energy
Results	Energy saved (toe)	48 530	76 181
Targets	Target to 2016 (toe)	98 236	154 207
	Execution with regard to 2016	*49%*	

	Target to 2020 (toe)	98 236	154 207
	Execution with regard to 2020		*49%*

Monitoring methodology (Bottom-Up)

TABLE 22

Variables considered in the follow up methodology for measure RSp1m2 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	No. of light bulbs acquired voluntarily	N1	un.
V	No. of light bulbs distributed through incentive	N2	un.
V	Average power of light bulbs in use	P. conventional	W
V	Average power of energy saving light bulbs	P. with incentive	W
V	No. of hours functioning of light bulbs in use	nh	H
V	Saving in final unit energy	UFES	kWh/un
P	Correction factor which takes into account the No. of light bulbs sold which did not replace existing light bulbs	Frep	No dimension
P	Conversion factor for electrical energy to final energy	Fce	toe/GWh
P	Conversion factor for electrical energy to primary energy	Fce2	toe/GWh

Calculation Formula

$$EE = \left(P_{conventional} - P_{withincentive}\right) \times nh \times \left(\frac{Frep}{1000}\right) \times \left(N1 + N2\right) \times Fce$$

RSp1m3 – Efficient Glazing

This measure, which is part of the set of measures aimed at renovating the residential sector, includes actions for building exteriors and seeks to improve glass surfaces, both by the use of double glazing or the use of thermally insulated frames as well as the use of efficient glazing (with low emissions).

The aim of this measure is to promote the substitution of glass surfaces along with a system of product labelling. It is expected that between 750 000 and 800 000 m^2 of efficient glass will be installed by 2016.

The data on the installed windows refers to windows sold in the market, distributed according to the weighting attributed to restored buildings, considering all construction work carried out annually. The expected evolution in the installation of more efficient glazing includes the full functioning of the product labelling system from 2013 onwards.

The objective of this system is not just to promote the registration of manufacturers and the installation of efficient windows but, above all, to provide the market with a tool which enables a suitable comparison of the energy performance of the different equipment.

The implementation of this measure is the result of the potential identified by means of improvement measures included in energy certificates as well as specific support targeting the area of energy efficiency.

RESULTS

TABLE 23

Impact of the measure 'Efficient Windows' on NEEAP 2016

Measure RSp1m3		Final energy	Primary energy
Results	Energy saved (toe)	311	339
Targets	Target to 2016 (toe)	997	1 088
	Execution with regard to 2016	*31%*	
	Target to 2020 (toe)	1 500	1 636
	Execution with regard to 2020		*21%*

Monitoring methodology (Bottom-Up)

TABLE 24

Variables considered in the follow up methodology for measure RSp1m3 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Thermal transmission coefficient of replaced windows	U_initial	$W/m^2/K$
V	Thermal transmission coefficient of efficient windows	U_new	$W/m^2/K$
V	No. of degree-days of heating/cooling	GDA	K*days/year
V	Unitary final energy savings	UFES	kWh/m^2
V	Area of windows with double or triple glazing installed	A	m^2
V	% of heating/cooling by electrical sources	-	%
V	% of heating/cooling by fossil sources	-	%
P	Coefficient 'a': Correction factor depending on the climate area of the building. a=1 if national data does not exist for calculation	A	No dimension
P	Coefficient 'b': Correction factor depending on the mean efficiency of the heating system	B	No dimension
P	Coefficient 'c': Intermittency coefficient depending on the operational continuity of the heating system. c=0.5 if national data does not exist for calculation	C	No dimension
P	Conversion factor for electrical energy to final energy	Fce	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

$$EE = \frac{\left(U_{\_initial} - U_{\_new}\right) \times GDA \times 24h \times a \times \left(\frac{c}{b}\right)}{1000} \times A \times \left(\frac{Fce}{1 \times 10^6}\right)$$

RSp1m4 – Efficient Insulation

As with the previous measure, this measure is also aimed at renovating the residential sector and includes the thermal insulation of building exteriors. It applies to roofs, flooring and walls.

The aim of this measure in the restoration of buildings includes the installation of efficient insulation. It is expected that about 3 million m_2 of efficient insulation materials will be installed by 2016 in buildings requiring repairs.

The evolution of the number of installed square meters, in terms of thermal insulation, is being revised and lowered essentially due to the current economic climate. It is expected that the figures could improve gradually from 2014 onwards.

The implementation of this measure is the result of the potential identified by means of improvement measures included in energy certificates as well as specific support targeting energy efficiency.

RESULTS

TABLE 25
Impact of the measure 'Efficient Insulation' on NEEAP 2016

Measure RSp1m4		Final energy	Primary energy
Results	Energy saved (toe)	435	475
Targets	Target to 2016 (toe)	1 068	1 165
	Execution with regard to 2016	*41%*	
	Target to 2020 (toe)	1 716	1 872
	Execution with regard to 2020		*25%*

Monitoring methodology (Bottom-Up)

TABLE 26
Variables considered in the monitoring methodology for measure RSp1m4 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Thermal transmission coefficient of element with replaced insulation	U_initial	$W/m^2/K$
V	Thermal transmission coefficient of element with efficient insulation	U_new	$W/m^2/K$
V	No. of degree-days of heating/cooling	GDA	K*days/year
V	Unitary final energy savings	UFES	kWh/m^2
V	Area of thermal insulation applied to buildings	A	m^2
V	% of heating/cooling by electrical sources	-	%
P	Coefficient 'a': Correction factor depending on the climate area of the building. a=1 if national data does not exist for calculation	A	No dimension
P	Coefficient 'b': Correction factor depending on the mean efficiency of the heating system	B	No dimension
P	Coefficient 'c': Intermittency coefficient depending on the operational continuity of the heating system. c=0.5 if national data does not exist for calculation	C	No dimension
P	Conversion factor for electrical energy to final energy	Fce	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

$$EE = \frac{\left(U_{\_initial} - U_{\_new}\right) \times GDA \times 24h \times a \times \left(\frac{c}{b}\right)}{1000} \times A \times \left(\frac{Fce}{1 \times 10^{6}}\right)$$

RSp1m5 – Green Heating

This measure aims to encourage the implementation of heat recovery mechanisms in houses, as a complementary measure and as an alternative to traditional means of heating (open fireplaces). Moreover, heat recovery units combine the advantages of the use of biomass with a system of forced air enabling the uniform distribution of the hot air produced in the spaces to be heated.

An associated energy saving of 75% is estimated when a renewable source of energy is used, which represents a reduction of 0.68 toe/dwelling with intervention based on the domestic sector consumption survey carried out by the DGEG and by the National Statistics Institute (*Instituto Nacional de Estatística, I.P.* - INE, I.P.) in 2010.

The introduction of this type of equipment in the market is directly related to the evolution of the prices of electricity and gas, since biomass is considered to be one of the main alternatives. Thus, an annual positive evolution of 2% was considered for the volume of equipment installed, in line with the forecasts by manufacturers in this sector.

Certification systems are being considered to implement this measure, for equipment, installers and the biomass, so as to ensure a level of quality which will also promote consumer confidence and usage. Promotion campaigns will also be developed involving the State, sector associations and equipment manufacturers, with a view to highlighting the advantages of this heating solution, emphasising the ease of installation and efficiency, as well as the fact that the equipment is easy to use and safe while offering low cost and ecological solutions.

RESULTS

TABLE 27

Impact of the measure 'Green Heating' on NEEAP 2016

Measure RSp1m5		Final energy	Primary energy
Results	Energy saved (toe)	15 796	15 796
Targets	Target in 2016 (toe)	110 249	110 249
	Execution in 2016	*14%*	
	Target in 2020 (toe)	157 354	157 354
	Execution in 2020		*10%*

Monitoring method (Bottom-Up)

TABLE 28

Variables considered in the monitoring methodology for measure RSp1m5 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	N.º of heat recovery systems sold	N	Un.
V	% º of heat recovery systems installed which replaced fireplaces in existing buildings, including apartments and detached houses	%Subs	Un.
V	Domestic consumption of a heat recovery system	Ce	toe/dwelling
V	% of consumption reduction per installation of a heat recovery system	%red	%

Calculation Formula

$$EE = N \times \%Subs \times Ce \times \%red$$

Programme RSp2 – Energy Efficiency System for Buildings

The Energy Certification Programme aims to improve the energy performance of buildings, by improving the average energy efficiency class of urban structures by implementing the guidelines which regulate the ECS.

RSp2m1 - ECS Residential Buildings

The ECS makes it compulsory for new buildings or large-scale restoration of buildings to achieve minimum levels of efficiency based on levels of classifications (B- to A+). Moreover, specific regulations can also develop mechanisms to further improve the energy classification of buildings.

New buildings

The aim for this indicator is to certify around 268 000 residential homes by 2020 with an energy classification of B- or higher, within the scope of new buildings or buildings undergoing significant remodelling. This objective was defined on the basis of the evolution of the ECS regarding the number of buildings certified until 2012, the scenario for economic evolution and the dynamism of the real estate market.

Between 2007 and 2012, the annual average registration for these buildings was 19 300 residential homes of which 7.7% were related to large scale renovations.

In terms of forecasts for the evolution of buildings certified between 2012 and 2020, a scenario was envisaged in 2013 on the basis of the trend in buildings certified in the past two years and the present situation of the real estate sector. A growth in the real estate market is expected to occur from 2014 onward, along with a trend towards a positive evolution, likewise promoted by an increase in the rate of renovations of existing buildings.

The impact of this measure was determined on the basis of the estimate of emissions from Energy Certificates for new homes and large-scale renovation, issued within the scope of the ECS, and an impact factor, expressed in toe/dwelling. The impact factor reflects the evolution in terms of requirements and energy efficiency underlying the regulatory revisions of laws related to the energy performance of buildings.

The value of the consumption reduction factor per dwelling for 2011 and 2012 was determined to be 0.203 toe/ dwelling, after considering the most recent statistical information regarding the improvement of the energy performance of properties taken from the ECS database. After 2013, a new reduction factor will be determined for energy consumption per dwelling by applying the new energy certification system for buildings. In the meantime, assuming the current relationship of nominal consumption contained in the certificates at the ECS and the real values resulting from the ICESD 2010, the value of the consumption reduction factor per dwelling corresponds to 0.23 toe/ dwelling.

Energy certificates issued for residential real estate constructed between the beginning of 2007 and the end of 2010 were included in this measure until 2010, since, even though they did not have a Regulatory Compliance Declaration (DCR) on the project's phase (due to the schedule for the ECS to come into effect), they already considered the technical requirements for new buildings in their projects.

Existing buildings

In the case of existing buildings, it is necessary to verify the savings to be derived from implementing the improvement measures identified for dwellings requiring energy certification. Keeping in mind the number of existing certified buildings in Portugal and the level of implementation of said improvement measures, it was decided to consider the individual contribution of each specific measure n relation to other vectors stipulated in the NEEAP, *viz*. those referring to the Solar Heating, Green Heating, Efficient Glazing and Efficient Insulation measures.

RESULTS

TABLE 29

Impact of the measure 'SCE Residential Buildings' on NEEAP 2016

Measure RSp2m1		Final energy	Primary energy
Results	Energy saved (toe)	57 473	71 554
Targets	Target in 2016 (toe)	77 473	96 453
	Execution in 2016	*74%*	
	Target in 2020 (toe)	94 580	117 751
	Execution in 2020		*61%*

Monitoring methodology (Bottom-up)

TABLE 30

Variables considered in the monitoring methodology for measure RSp2m1 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Number of residential dwellings with Energy Certification with year of construction from start of 2007 to end of current year	-	Dwellings
P	% of final energy saved coming from electricity	-	%

Calculation formula

Savings were calculated on the basis of the information in the energy certificates in the ECS database.

RSp2m2 – ECS for Service Buildings

The ECS makes it compulsory for new buildings or large-scale renovations to have minimum levels of efficiency classes (B- to A+). In addition, mechanisms can be developed by means of specific regulations which promote improvements in the energy classification of buildings.

The target is to certify, by 2020, around half the number of service buildings as having an energy class of B- or higher.

This measure included the useful floor area of buildings certified since the ECS came into effect and until the end of 2020, which was 58 563 066 m_2, corresponding to a total of 22 837 certificates of properties within the scope of the Regulations for Climate Control Energy Systems in Buildings (RSECE). In 2011 and 2012, the number of service buildings accounted for within the scope of the RCCTE was 3 551. From 2013 onwards these buildings will be analysed within the scope of the RSECE and therefore the forecast for 2013-2020 has already considered this factor.

The impact of this measure was determined on the basis of the estimate of emissions from Energy Certificates for new homes and large-scale renovation, issued within the scope of the ECS, and an impact factor, expressed in toe/dwelling. The impact factor reflects the evolution in terms of requirements and energy efficiency underlying the regulatory revisions of laws related to the energy performance of buildings.

The forecast for the buildings certified in the period 2013-2020 was based on the expected increase due to new legislation (in effect from 2013 onwards) which will promote greater certification of this type of building as well as the evolution of the definition of a large service building (indexed to the area of the building).

The value of the impact factor on the energy consumption of the buildings falling within the scope of the RSECE for 2011-2020 is 2.49 kgoe/m^2, after considering the most recent statistical information regarding improvements in the energy performance of buildings, taken from the ECS database.

For service buildings falling within the scope of the RCCTE and keeping in mind the information available in the ECS database, the value of the consumption reduction factor per dwelling was estimated at 0.173 toe/dwelling.

RESULTS

TABLE 31

Impact of the measure 'SCE Services Buildings' on NEEAP 2016

Measure RSp2m2		Final energy	Primary energy
Results	Energy saved (toe)	23 697	29 098
Targets	Target in 2016 (toe)	83 272	102 251
	Execution in 2016	*28%*	
	Target in 2020 (toe)	152 671	187 465
	Execution in 2020		*16%*

Monitoring methodology (Bottom-Up)

TABLE 32
Variables considered in the monitoring methodology for measure RSp2m2 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Dwellings of services with Energy Certification issued	-	Dwellings
V	Area of dwellings of services with Energy Certification issued	-	m^2
P	% of final energy saved coming from electricity	-	%

Calculation formula

Savings were calculated on the basis of the information contained in the energy certificates in the ECS database.

Programme RSp3 - Solar Heating

The programme aims to promote the integration of solar heating systems in existing and future buildings in the domestic and services sectors and consists of two measures.

RSp3m1 – Residential Solar Heating

The measure aims to create a sustained market for the residential sector of 100 000 m^2 of solar panels installed per year, which would result in about 800 000 m^2 of installed and operational panels by 2016 and around 1.2 million m^2 by 2020.

This programme also aims to revitalise existing infrastructure, creating favourable conditions for substituting and/or specialised repair/maintenance.

The implementation of this measure is the result of the potential identified by means of the Energy Certification of Buildings (new buildings and improvement measures included in the energy certificates of existing buildings), leveraged by means of specific support aimed at the area of energy efficiency, including negotiating lines of credit essentially targeting the domestic sector.

RESULTS

TABLE 33
Impact of the measure 'Residential Solar Thermal' on NEEAP 2016

Measure RSp3m1		Final energy	Primary energy
Results	Energy saved (toe)	16 303	16 303
Targets	Target in 2016 (toe)	52 236	52 236
	Execution in 2016	*31%*	
	Target in 2020 (toe)	81 238	81 238
	Execution in 2020		*20%*

Monitoring method (Bottom-Up)

TABLE 34
Variables considered in the monitoring methodology for measure RSp3m1 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Area installed per year	A	m^2
V	Thermal production	USAVE	toe/m^2
V	Specific final energy saving	UFES	toe/m^2
P	Performance of water heaters	η	%

Calculation Formula

$$EE = \frac{USAVE}{\eta} \times A$$

RSp3m2 - Solar Heating for Services

The measure aims to create a sustained market, with an installation of 40 000 m^2 of solar panels per year, which would result in around 330 000 m^2 of panels installed and operational by 2016 and around 500 000 m^2 by 2020.

The measure is being implemented due to the potential identified by means of Energy Certification for Buildings (new buildings and improvement measures included in the energy certification of existing buildings), leveraged by means of specific national and Community support for energy efficiency.

RESULTS

TABLE 35
Impact of the measure 'Solar Thermal Services' on NEEAP 2016

Measure RSp3m2		Final energy	Primary energy
Results	Energy saved (toe)	4 532	4 532
Targets	Target in 2016 (toe)	21 371	21 371
	Execution in 2016	*21%*	
	Target in 2020 (toe)	34 663	34 663
	Execution in 2020		*13%*

Monitoring method (Bottom-Up)

TABLE 36
Variables considered in the monitoring methodology for measure RSp3m2 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Area installed per year	A	m^2
V	Thermal production	USAVE	toe/m^2
V	Specific final energy saving	UFES	toe/m^2
P	Performance of water heaters	η	%

Calculation Formula

$$EE = \frac{USAVE}{\eta} \times A$$

3.2.2 Summary of the Measures in the Residential and Services Sector

TABLE 37
Impact of the Residential and Services sector on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	Primary	Final	Primary		Final	Primary	
Home and Office Renewal	RSp1m1	99 931	156 869	189 363	297 257	53%	235 535	361 886	43%
	RSp1m2	48 530	76 181	98 236	154 207	49%	98 236	154 207	49%
	RSp1m3	311	339	997	1 088	31%	1 500	1 636	21%
	RSp1m4	435	475	1 068	1 165	41%	1 716	1 872	25%
	RSp1m5	15 796	15 796	110 249	110 249	14%	157 354	157 354	10%
Building Efficiency System	RSp2m1	57 473	71 554	77 473	96 453	74%	94 580	117 751	61%
	RSp2m2	23 697	29 098	83 272	102 251	28%	152 671	187 465	16%
Solar Thermal	RSp3m1	16 303	16 303	52 236	52 236	31%	81 238	81 238	20%
	RSp3m2	4 532	4 532	21 371	21 371	21%	34 663	34 663	13%
Measures already concluded		0	0	0	0	0	0	0	0
Total NEEAP		267 008	371 147	634 265	836 277	42%	857 493	1 098 072	34%

(1) With regard to final energy.
(2) With regard to primary energy.

3.3 Industry

This area continues the Energy Efficiency System for Industry and other Sectors programme, with particular emphasis on revising the SGCIE.

3.3.1 Programmes and Measures

Programme Ip1 - Energy Efficiency System for Industry and other Sectors

The measures in the industrial sector will continue to focus on the implementation of the SGCIE, more specifically through the potential for energy savings stipulated in the PREN and which result from the implementation of obligatory energy audits. The measures have been distributed in the following manner:

a) Measure Ip1m1 - SGCIE – Transversal Measures
b) Measure Ip1m2 - SGCIE – Specific Measures
c) Measure Ip1m3 - SGCIE – Other Sectors

Keeping in mind the implementation and the assessment of the SGCIE, it will be revised in order to expand its scope of application as well as to improve the level of monitoring of energy consumption or the conditions of incentives to encourage companies to join voluntarily. The review will also improve the monitoring of the implementation of energy efficiency measures, more specifically by using measuring and verification protocols. This review of the SGCIE is also to encourage companies to adopt European standards for energy management systems (e.g. ISO 50001).

Efforts will also be made to converge the obligations on improving energy efficiency stipulated in Decree-Law No 34/2011 of 8 March 2011, amended by Decree-Law No 25/2013 of 19 February 2013, referring to the mini-production system, so that they are framed within the SGCIE regulations.

Ip1m1 - SGCIE Transversal Measures

The transversal measures include four technological areas:

Electric Motors;

Production of Heat and Cold;

Lighting;

Other measures for energy efficiency in industrial processes.

Transversal Measures	
Scope	*Measure/Technology*
Electric Motors	Optimization of motors Pumping systems Ventilation systems Compression systems
Production of Heat and Cold	Cogeneration Combustion systems Heat recovery Industrial cold
Lighting	Efficient lighting
Industrial Process Efficiency / Other	Monitoring and control Effluent treatment Process integration Maintenance of energy consuming equipment Thermal insulation Transport Training and awareness raising of human resources Reduction of reactive energy

These measures were grouped given their generalized applicability in the sectors covered by the regulation.

RESULTS

TABLE 38

Impact of 'SGCIE Transversal Measures' on NEEAP 2016

Measure Ip1m1		Final energy	Primary energy
Results	Energy saved (toe)	16 093	18 010
Targets	Target in 2016 (toe)	100 000	111 912
	Execution in 2016	*16%*	
	Target in 2020 (toe)	150 000	200 000
	Execution in 2020		*9%*

Monitoring Methodology (Bottom-Up)

TABLE 39

Variables considered in the monitoring methodology for measure Ip1m1 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Energy Savings in Electric Motors (final energy)	-	toe
V	— Of which: Electricity	-	toe
V	Energy Savings in the Production of Heat and Cold (final energy)	-	toe
V	— Of which: Electricity	-	toe
V	Energy Savings in Lighting (final energy)	-	toe
V	— Of which: Electricity	-	toe
V	Energy Savings in Industrial Process Efficiency / Other (final energy)	-	toe
V	— Of which: Electricity	-	toe

Calculation Formula

Savings obtained on the basis of information from energy audits and rationalisation plans in the SGCIE database.

Ip1m2 - SGCIE Specific Measures

In addition to the transversal measures, a set of Specific or Sectoral Measures have been identified for a significant range of industrial sectors, which indicate possible actions, applicable only to the respective production processes.

Specific or Sectoral Measures	
Sector	*Measure/Technology*
Food and beverages	Optimization of sterilization Separation processes with membranes Changing of horizontal mills to vertical mills Vacuum distillation
Ceramics	Optimization of kilns Improvement of dryers Vapour extrusion Hard extrusion Optimization of powder production Use of alternative fuels
Cement	Optimization of grinders Use of alternative fuels (e.g. biomass) Reduction in use of clinker in cement Use of natural gas (to replace pet coke)
Wood and Wood products	Mechanical conveyors instead of pneumatic conveyors Application of own biomass Optimization of lumber drying chambers and kilns
Metal-electrical-mechanical	Submersed combustion to heat tanks Reuse of waste Optimization of furnaces
Metal Working and Casting	Improvement in the quality of anodes and cathodes Melting sector Number of casts per cavity Performance of vast metal Reduction in scrap rate Dust removal Increase in cycle rate Reduction of over thicknesses
Paste and Paper	Gasification / Burning of black liquor and other residues Optimization of drying
Chemicals, Plastics and Rubber	New separation operations (e.g. membrane) Use of new catalysers Optimization of distillation
Steel Works	Improvement of electrical furnaces Smelting reduction processes Simultaneous moulding and shaping
Textiles	Optimization of tank operations Mechanical Pre-drying / IV Water heated by solar panels Optimization of textile production processes
Clothing, Footwear and Leathers	Improvement in cleaning / tanks Cloth cutting and joining technologies Water heated by solar panels
Glass	Optimization of furnaces Use of used glass (recycling)

RESULTS

TABLE 40
Impact of 'SGCIE Specific Measures' on NEEAP 2016

Measure Ip1m2		Final energy	Primary energy
Results	Energy saved (toe)	3 693	3 693
Targets	Target in 2016 (toe)	20 000	20 000
	Execution in 2016	*18%*	
	Target in 2020 (toe)	36 000	36 000
	Execution in 2020		*10%*

Monitoring Methodology (Bottom-Up)

TABLE 41
Variables considered in the monitoring methodology for measure Ip1m2 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Final Energy Savings	-	Toe
V	Food, beverages and tobacco	-	Toe
V	Textiles	-	Toe
V	Paste and Paper	-	Toe
V	Chemicals, Plastics and Rubber	-	Toe
V	Ceramics	-	Toe
V	Metal Working and Casting	-	Toe
V	Glass	-	Toe
V	Cement	-	Toe
V	Clothing, Footwear and Leathers	-	Toe
V	Steel Making	-	Toe
V	Wood and Wooden Articles	-	Toe
V	Metal-electrical-mechanical	-	Toe
P	Conversion factor for electrical energy to final energy	Fce	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

Savings obtained on the basis of information from energy audits and rationalisation plans in the SGCIE database.

Ip1m3 - SGCIE Other Sectors

This measure identifies the potential for savings indicated in the SGCIE for other sectors of activity in addition to those mentioned in measure Ip1m2, as well as the potential results of new cogeneration projects or other actions not directly linked to the implementation of the SGCIE but which increase the energy efficiency of the industrial sector.

RESULTS

TABLE 42
Impact of the measure 'SGCIE Other Sectors' on NEEAP 2016

Measure Ip1m3		Final energy	Primary energy
Results	Energy saved (toe)	22 800	22 800
Targets	Target in 2016 (toe)	110 000	110 000
	Execution in 2016	*21%*	
	Target in 2020 (toe)	150 000	150 000
	Execution in 2020		*15%*

Monitoring Method (Bottom-Up)

TABLE 43
Variables considered in the monitoring methodology for measure Ip1m3 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Savings in other sectors of activity (c/s SGCIE). Includes SGCIE and Cogeneration	-	toe

Calculation Formula

Savings obtained on the basis of information from energy audits and rationalisation plans in the SGCIE database.

3.3.2 Summary of the Measures in the Industrial Sector

TABLE 44
Impact of the Industry on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 Toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	Primary	Final	Primary		Final	Primary	
	Ip1m1	16 093	18 010	100 000	111 912	16%	150 000	200 000	9%
	Ip1m2	3 693	3 693	20 000	20 000	18%	36 000	36 000	10%
	Ip1m3	22 800	22 800	110 000	110 000	21%	150 000	150 000	15%
Measures already concluded		135 309	135 309	135 309	135 309	100%	135 309	135 309	100%
Total NEEAP		177 895	179 812	365 309	377 221	49%	471 309	521 309	34%

(1) With regard to final energy.
(2) With regard to primary energy.

3.4 State

Council of Ministers Resolution Nos 2/2011 of 12 January 2011 and 67/2012 of 9 August 2012, regarding the Energy Efficiency Programme for the Public Administration - ECO.AP, created the necessary conditions for developing an effective energy efficiency policy in the State sector, with a view to achieving a 30% increase in energy efficiency by 2020 as compared to the figures for current consumption in public buildings and infrastructure.

3.4.1 Programmes and Measures
Programme Ep1 – State Energy Efficiency

This programme aims to achieve energy savings in four areas: the Energy Certification of Buildings and Energy Efficiency Management Contracts, Energy Efficiency Action Plans, Fleet Management and Public Lighting.

The implementation of some of the measures described below have been supported in the energy services companies (ESE) market, subject to a system of registration and qualification, as established in Legislative Order No 15/2012 of 3 July 2012, published in the Portuguese Official Gazette Series 2, No 127, of 3 July 2012, with a view to guaranteeing the quality of the services provided. These are the companies which, within the scope of the ECO.AP Programme, will sign energy efficiency management contracts with the State for the buildings which are included in this programme, promoting the intervention and investment necessary to ensure improvements in their energy performance.

Ep1m1 - Energy Certification of State Buildings and Energy Efficiency Management Contracts

The ECO.AP Programme introduces a set of initiatives to promote measures for improving energy efficiency in Public Administration, to be implemented in the short, medium and long-term in public services, entities and infrastructure, with a view to changing behaviour and implementing rational management of energy services.

The target set for 2020 is for a total of 2 225 State buildings to be subject to certification. From this total, energy efficiency contracts will be signed for about 500 buildings within the scope of the ECO.AP Programme, involving buildings which represent at least 20% of the energy consumption of each ministry. The intervention of the ESEs in these buildings is expected to promote a 30% saving in energy consumption.

The Energy Certification of State Buildings measure will be leveraged further by the implementation of the ECO.AP Programme. The ESEs which have been awarded the energy performance contracts will be responsible for ensuring this certification.

RESULTS

TABLE 45
Impact of the measure 'Energy Certification of State Buildings and Energy Efficiency Management Contracts' on NEEAP 2016

Measure Ep1m1		Final energy	Primary energy
Results	Energy saved (toe)	4 769	6 806
Targets	Target in 2016 (toe)	66 133	94 393
	Execution in 2016	*7%*	
	Target in 2020 (toe)	139 755	199 476
	Execution in 2020		*3%*

Monitoring Method (Bottom-Up)

TABLE 46

Variables considered in the monitoring methodology for measure Ep1m1 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Buildings with improvement in energy classification	-	Buildings
V	Area of buildings	-	m^2
P	% of final energy saved coming from electricity	-	%
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

Savings achieved on the basis of information from the energy certificates in the ECS database and the results of the implementation of projects within the scope of the ECO.AP programme.

Ep1m2 – Energy Efficiency Action Plans for Public Administration - ECO.AP

Energy efficiency action plans will be prepared in the situations described in Paragraph 2(d) of Council of Ministers Resolution No 2/2011 of 12 January 2011, i.e. for buildings with lower levels of energy consumption and which have not been included in the group identified by each ministry to be part of the energy efficiency management contracts to be signed with ESEs.

Two types of measures are to be defined in these plans, *viz.* active and passive.

In terms of active measures, the interventions consist of introducing more efficient lighting technologies and control systems, replacing climate control devices for more efficient equipment and installing solar panels to produce hot water in buildings or infrastructure with high usage, such as schools and multipurpose halls. Promoting a policy of ecological public procurement in the purchase of equipment is also an important aspect of this area, as is promoting the use of teleconferencing technologies to hold meetings.

With regard to passive measures, solutions in the areas around buildings will be emphasised, from installing insulation in solid elements (walls, flooring, roofs) of buildings to equipment to provide shade (inside and outside).

The effects of these measures will be monitored and assessed by means of the Public Administration Energy Efficiency Barometer. This barometer aims to compare and publicly disseminate the energy and low carbon performance of the services of each ministry, namely the respective consumption and energy efficiency action plans, so as to implement Parliament Resolution No 114/2010 of 29 October 2010, which made the publishing of the Public Administration's energy bill compulsory.

The editions of the Public Administration Energy Efficiency Barometer will be reinforced with the launch of the Public Administration Energy Efficiency Guide, as well as the attribution of the awards to highlight best practices in Public Administration.

In addition to the incentives to rationalise the respective consumption and energy costs, attempts will be made to ensure that Public Administration serves as a reference and is an important agent for disseminating energy efficiency and low carbon best practices.

In this context, funding mechanisms shall be developed to support the implementation of these plans, including studies, to monitor their implementation and to train the local energy managers stipulated in Paragraph 3 of Council of Ministers Resolution No 2/2011 of 12 January 2011.

Without prejudice to the different scopes of the energy efficiency action plans stipulated in Council of Ministers Resolution No 2/2011 of 12 January 2011 and the low carbon sectoral plans stipulated in Council of Ministers Resolution No 93/2010 of 26 November 2010, the local energy managers must act as a link between both plans.

RESULTS

TABLE 47

Impact of the measure 'Energy efficiency in Public Administration Action Plans - ECO.AP' on NEEAP 2016

Measure Ep1m2		Final energy	Primary energy
Results	Energy saved (toe)	1 016	1 016
Targets	Target in 2016 (toe)	18 237	25 727
	Execution in 2016	*6%*	
	Target in 2020 (toe)	32 192	45 400
	Execution in 2020		*2%*

Monitoring Method (Bottom-Up)

TABLE 48

Variables considered in the monitoring methodology for measure Ep1m2 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Buildings with improvement in energy classification	-	Buildings
V	Area of buildings	-	m^2
P	% of final energy saved coming from electricity	-	%
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation formula

Savings achieved on the basis of information from the energy certificates in the ECS database and the results of the implementation of projects within the scope of the ECO.AP programme.

Ep1m3 – More Efficient State Transport

This measure aims to introduce energy efficiency and environmental criteria for transport, namely in terms of renovating the public fleet with low emission vehicles, implementing the guidelines of the National Strategy for Ecological Public Procurement, phasing out vehicles with higher CO_2 emissions and creating mobility plans for public entities where this is justified.

The implementation of this measure is the result of legislation underlying the activity of the Public Administration Shared Services Entity (*Entidade de Serviços Partilhados da Administração Pública, I. P.* - ESPAP). The competences of ESPAP include actions for ecological and low energy consumption public procurement for the State.

RESULTS

TABLE 49
Impact of the measure 'More Efficient State Transport' on NEEAP 2016

Measure Ep1m3		Final energy	Primary energy
Results	Energy saved (toe)	165	165
Targets	Target in 2016 (toe)	1 800	1 800
	Execution in 2016	*9%*	
	Target in 2020 (toe)	3 177	3 177
	Execution in 2020		*5%*

Monitoring Method (Bottom-Up)

TABLE 50
Variables considered in the monitoring methodology for measure Ep1m3 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	No. of new cars with diesel engines	N1	Vehicle
V	No. of new cars with petrol engines	N2	Vehicle
V	Mean CO2 emissions factor of new cars with diesel engines	E1	gCO_2/vkm
V	Mean CO2 emissions factor of new cars with petrol engines	E2	gCO_2/vkm
V	No. of km driven	D	Km
P	Mean CO2 emissions factor of replaced vehicles	Eref	gCO_2/vkm
P	Conversion factor of grams of CO_2 into energy (petrol)	Fce2	$KgCO_2$/toe
P	Conversion factor of grams of CO_2 into energy (diesel)	Fce1	$KgCO_2$/toe

Calculation Formula

$$EE = \frac{N1 \times D \times \left(\frac{E_{ref} - E1}{Fce1} \right)}{1000} + \frac{N2 \times D \times \left(\frac{Eref - E2}{Fce2} \right)}{1000}$$

Ep1m4 – Efficient Public Lighting

In Portugal, Public Lighting (PL) accounts for 3% of energy consumption. However, in recent years there has been a tendency to increase the PL network (at a rate of about 4% to 5% per year), which necessitated a set of measures to increase the energy efficiency of Public Lighting.

Regulations for Public Lighting will be published, which will cover the projects, a cost-benefits analysis, public tenders, monitoring and controlling these types of systems, in order to ensure energy efficiency gains, reduce costs and provide a suitable level of service, so as to improve the economic and environmental sustainability of municipalities.

Examples of interventions in PL projects include the installation of luminous flux regulators, substituting inefficient or obsolete bulbs and ballasts, substituting mercury vapour lamps with more efficient lighting equipment, installing technologies to control, manage and monitor PL and the substitution of illumination in traffic and pedestrian control systems by LED technology.

In a similar manner to the ECO.AP programme, the use of ESEs is also a fundamental component of PL projects, so as to sign Energy Performance Contracts (EPC) by means of public tenders.

Moreover, all the information on Public Lighting dispersed over different public and private entities will be combined and integrated into a single database, which will serve to guide the definition of public policies in PL energy efficiency in the future.

RESULTS

TABLE 51
Impact of the measure 'Efficient Public Lighting' on NEEAP 2016

Measure Ep1m4		Final energy	Primary energy
Results	Energy saved (toe)	3 952	6 203
Targets	Target in 2016 (toe)	20 209	31 714
	Execution in 2016	*20%*	
	Target in 2020 (toe)	30 301	47 399
	Execution in 2020		*13%*

3.4.2 Summary of Measures in the State Sector

TABLE 52
Impact of the State on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	Primary	Final	Primary		Final	Primary	
State Energy Efficiency	Ep1m1	4 769	6 806	66 133	94 393	7%	139 755	199 476	3%
	Ep1m2	1 016	1 016	18 237	25 727	6%	32 192	45 400	2%
	Ep1m3	165	165	1 800	1 800	9%	3 177	3 177	5%
	Ep1m4	3 952	6 203	20 209	31 714	20%	30 301	47 399	13%
Measures already concluded		0	0	0	0	0%	0	0	0%
Total NEEAP		9 902	14 190	106 380	153 634	9%	205 425	295 452	5%

(1) With regard to final energy.
(2) With regard to primary energy.

3.5 Behaviour

The area of Behaviour includes a programme to promote energy efficient consumer habits and attitudes, such as recommending efficient products, by means of awareness and communications campaigns.

The activities to be developed will be carried out parallel to the specific measures stipulated in this Plan, serving as a catalyst for them, but also adjusting behaviour in addition to implementing the measures. The impact in the area of behaviour can be

monitored by bottom-up indicators for specific measures, but top-down indicators will be used in general, which will make it possible to identify the behavioural effects in addition to the application of the specific measures in the diverse areas and programmes.

Only the impact of measures which have already been assessed in previous implementation reports have been quantified, since the future impact of the measures which are part of this programme will be ascertained by means of follow-up of the campaigns to be implemented, owing to the difficulty of quantifying them. However, it is expected that the impact which is already evident will be maintained, along with what has been quantified as additional potential under this Plan.

An example of this type of measure is the effect of an increase in VAT from the reduced rate of 6% to the normal rate of 23% on two energy sources which have a substantial impact in the residential and services area: electricity and natural gas. The impact of this fiscal measure in changing consumer behaviour will be studied by means of top-down indicators and developed in-depth by means of specific surveys.

3.5.1 Programmes and Measures

Programme Cp1 – Communicating Energy Efficiency

This programme aims to dynamise actions to introduce changes in the behaviour of individuals, at home, at work and for journeys, by adopting energy efficiency best practices.

The behavioural measures essentially emphasise the correct use of equipment and systems which consume energy, which can be improved by means of monitoring systems and providing information to assist managing consumption.

As has been mentioned, these measures are also complemented by actions and initiatives aimed at substituting less efficient equipment with equipment which has a better energy performance, in order to promote best practices and a more efficient use of such equipment.

Large home appliances can be cited as an example, where a reduction in consumption is promoted by labelling and by improving the minimum requirements for the ecological design of these products. However, it is necessary to carry out supplementary work so as to guide consumers to correctly use these devices (washing temperatures, load, use and installation distance for cooling devices, stand-by controls for devices, the use of sensors and timers etc., so as to promote and if possible improve the technological options which promote energy savings).

Cp1m1 – Energy at Schools

Recognising the role of education in changing the behaviour of individuals, a programme will be implemented based on information and awareness campaigns aimed at schools and especially at school age youths.

Campaigns will continue to be developed for school communities, including sports activities in partnership with institutions and companies which are a reference in the

energy sector, along with campaigns and prizes for disseminating information and raising awareness among students on the subject of energy efficiency. Other teaching material will be prepared to support the scheduled initiatives.

RESULTS

TABLE 53
Impact of the measure 'Energy at Schools' on NEEAP 2016

Measure Cp1m1		Final energy	Primary energy
Results	Energy saved (toe)	0	0
Targets	Target in 2016 (toe)	0	0
	Execution in 2016	*0%*	
	Target in 2020 (toe)	0	0
	Execution in 2020		*0%*

Monitoring Method (Bottom-Up)

TABLE 54
Variables considered in the monitoring methodology for measure Cp1m1 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Energy savings (final energy)	-	Toe
V	— Of which: Electricity	-	Toe
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh
P	Attenuation factor (taking into account what part of the initial impact ceases to exist due to returning to initial behaviour). In line with EC, it is considered that attenuation happens 2 years after the measure. This figure may be changed as soon as information becomes available.	-	%

Cp1m2 – Energy in Transport

This measure identifies the effect of awareness campaigns and actions resulting in a change in consumer behaviour and habits, promoting greater energy efficiency in the Transport sector.

Promoting the use of public transport and changing habits involving the everyday use of individual automobiles are factors which, if achieved on a sufficient scale, have a substantial impact at the level of reducing energy consumption.

The adoption of efficient driving measures or 'eco-driving' or merely the rational use of vehicles can lead to a significant reduction in the energy consumption of the transport sector. Campaigns will be implemented aimed at the general public regarding best practices for energy efficiency while using vehicles, along with 'eco-driving' programmes aimed at professional drivers.

Content has already been included in the programmes of driving schools to promote the practice of eco-driving.

RESULTS

TABLE 55

Impact of the measure 'Energy in Transport' on NEEAP 2016

Measure Cp1m2		Final energy	Primary energy
Results	Energy saved (toe)	0	0
Targets	Target in 2016 (toe)	0	0
	Execution in 2016	*0%*	
	Target in 2020 (toe)	0	0
	Execution in 2020		*0%*

Monitoring Method (Bottom-Up)

Follow-up analyses will be carried out after the campaigns which will be implemented.

Cp1m3 – Energy at Home

This measure ascertains the effects of the awareness campaigns and actions which change consumption habits and behaviour, so as to promote better energy efficiency at home.

Campaigns will be conducted to disseminate information on energy efficiency, by circulating informative material to be distributed to consumers at a national level.

Examples of these actions include the distribution of information at sales outlets and by means of the national press.

RESULTS

TABLE 56

Impact of the measure 'Energy at Home on NEEAP 2016

Measure Cp1m3		Final energy	Primary energy
Results	Energy saved (toe)	19 489	30 592
Targets	Target in 2016 (toe)	19 489	30 592
	Execution in 2016	*100%*	
	Target in 2020 (toe)	19 489	30 592
	Execution in 2020		*100%*

Monitoring Method (Bottom-Up)

TABLE 57

Variables considered in the monitoring methodology for measure Cp1m3 on NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Energy savings	-	Toe
V	— Of which: Electricity	-	Toe
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Cp1m4 – Energy at Work

The ‘Portugal Energy Efficiency Barometer 2010’ will be continued, which analyses the efficient use of energy in production processes in company facilities and activities, with a view to promoting innovative and more efficient energy consumption methods.

The attribution of a prize or award providing visibility and distinguishing companies which have a better energy performance in terms of a rational use of energy in the workplace will be one of the incentives to encourage companies to invest in energy efficiency measures, including behavioural changes and training for employees.

The results achieved by means of this type of initiative promote behavioural changes generated by their competitive effect.

RESULTS

TABLE 58

Impact of the measure ‘Energy at Work’ on NEEAP 2016

Measure Cp1m4		Final energy	Primary energy
Results	Energy saved (toe)	1 824	1 824
Targets	Target in 2016 (toe)	1 824	1 824
	Execution in 2016	*100%*	
	Target in 2020 (toe)	1 824	1 824
	Execution in 2020		*100%*

Monitoring Method (*Bottom-Up*)

TABLE 59

Variables considered in the monitoring methodology for measure Cp1m4 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Energy savings (final energy)	-	Toe
V	— Of which: Electricity	-	Toe
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh
P	Attenuation factor (taking into account what part of the initial impact ceases to exist due to returning to initial behaviour). In line with EC, it is considered that attenuation happens 2 years after the measure. This figure may be changed as soon as information becomes available.	-	%

Cp1m5 – Intelligent Meters promoting Energy Efficiency and Sustainability

This measure is based on expanding remote management and measuring to cover all energy end-users, with a view to monitoring and potentially reducing consumption and the respective costs of using energy, promoting energy efficiency and environmental sustainability.

These tools enable a detailed analysis of consumption, resulting in effective behavioural changes with regard to energy efficiency.

RESULTS

TABLE 60
Impact of the measure 'Intelligent Meters' on NEEAP 2016

Measure Cp1m5		Final energy	Primary energy
Results	Energy saved (toe)	0	0
Targets	Target in 2016 (toe)	0	0
	Execution in 2016	*0%*	
	Target in 2020 (toe)	0	0
	Execution in 2020		*0%*

Monitoring Method (Bottom-Up)

TABLE 61
Variables considered in the monitoring methodology for measure Cp1m5 in NEEAP 2016

Variables (V) and assumptions (P) in the calculation methodology		Name	Unit
V	Number of Intelligent Meters installed	-	Un
V	Average energy consumption per consumer	-	Toe
P	Reduction in consumption of energy due to meter	-	%
P	Conversion factor for electrical energy to final energy	-	toe/GWh
P	Conversion factor for electrical energy to primary energy	-	toe/GWh

Calculation Formula

$$EE = N \times \left(Ce1 \times P1 + Ce2 \times P2 \right)$$

3.5.2 Summary of the Measures in the Behaviour Sector

TABLE 62
Impact of Behaviour on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	Primary	Final	Primary		Final	Primary	
	Cp1m1	0	0	0	0	0%	0	0	0%
	Cp1m2	0	0	0	0	0%	0	0	0%
	Cp1m3	19 489	30 592	19 489	30 592	100%	19 489	30 592	100%
	Cp1m4	1 824	1 824	1 824	1 824	100%	1 824	1 824	100%
	Cp1m5	0	0	0	0	0%	0	0	0%
Measures already concluded		0	0	0	0	100%	0	0	0
Total NEEAP		21 313	32 416	21 313	32 416	100%	21 313	32 416	100%

(1) With regard to final energy.
(2) With regard to primary energy.

3.6 Agricultural Sector

The NEEAP 2008 covered a broad set of sectors - Transport, Industry, Residential and Services, State and Behaviour – but did not consider any impact resulting from the agricultural sector.

The NEEAP 2016 aims to correct this shortcoming, insofar as the agricultural sector alone accounts for around 3% of Portugal's final energy consumption, i.e. approximately 463 000 toe.

The measures implemented in the past in this sector, along with the measures envisaged as part of the national strategy for the agricultural sector, make it possible to identify potential actions and initiatives to be developed in this area which will have an impact on reducing energy consumption.

The area of Agriculture includes a programme entitled Energy Efficiency in the Agricultural Sector, which aims to help reduce energy consumption in this sector by modernising equipment, management systems and targeted energy audits.

3.6.1 Programmes and Measures

Programme Agp1 – Energy Efficiency in the Agricultural Sector

Agp1m1 – Energy Efficiency in the Agricultural Sector

This programme covers a set of measures related to upgrading and renovating agricultural and forestry equipment (e.g. tractors, harvesters, balers and choppers), improvements in pumping stations and irrigation systems and carrying out surveys and audits of the sector's activities.

Above all, it is important to identify measures which simultaneously contribute towards energy efficiency and hydro-efficiency in keeping with the National Action Plan for the Efficient Use of Water.

Other measures can also be formulated, which could cover areas as diverse as those shown in the following table:

TABLE 63

Other measures to be considered in the agricultural sector

Measures	Indicators
Support for the conversion of greenhouses heated by fossil fuels to geothermal sources and energy management systems	Reduction in consumption of fuels in greenhouses
Reduction in the use of agrochemicals through the introduction of techniques in biological agriculture and integrated protection	Reduction in chemicals used per hectare (ton/ha)
Support for the conversion and modernization of fleets of tractors and other agricultural and forestry machinery, with higher levels of efficiency and lower energy use	Consumption per km or consumption per hectare
Promotion of reduction in direct energy consumption (heat, lighting) for confined animals (stables, pig farms, aviaries, etc…)	Variation in energy consumption (GWh, toe) per installation or per head
Support for diagnostics testing or energy	Behavioural (top-down analysis through

audits on agricultural undertakings/advisory actions	comparison of specific consumption before and after)
Support for rural parcelling	Typical values in the reduction of fuel use
Modernization of irrigation systems	Specific consumption per hectare

In total, potential energy savings of around 40 000 toe were estimated for the 2020 time frame and around 30 000 toe for the 2016 time frame.

RESULTS

TABLE 64

Impact of the measure 'Energy Efficiency in the Agricultural Sector' on NEEAP 2016

Measure Agp1m1		Final energy	Primary energy
Results	Energy saved (toe)	0	0
Targets	Target in 2016 (toe)	30 000	30 000
	Execution in 2016	*0%*	
	Target in 2020 (toe)	40 000	40 000
	Execution in 2020		*0%*

3.6.2 Summary of the Measures in the Agricultural Sector

TABLE 65

Impact of the Agricultural Sector on NEEAP 2016

Programme	Measure Code	Results							
		Energy saved toe		Target 2016 Toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
		Final	Primary	Final	Primary		Final	Primary	
	Agp1m1	0	0	30 000	30 000	0%	40 000	40 000	0%
Measures already concluded		0	0	0	0				
Total NEEAP		0	0	30 000	30 000	0%	40 000	40 000	0%

(1) With regard to final energy.
(2) With regard to primary energy.

4. Overall Summary of the NEEAP

The savings to be achieved by means of the NEEAP 2016 are estimated to total 1501 ktoe, corresponding to a reduction in energy consumption of approximately 8.2% as compared to the average consumption witnessed in the period between 2001 and 2005, which is close to the indicative goal defined by the European Union of 9% energy savings by 2016.

The establishment of a time frame of 2020 for the purposes of accompanying and monitoring the estimated impact on primary energy consumption makes it possible to envisage compliance with the new goals identified by the EU, of achieving a 20% reduction in primary energy consumption by 2020, as well as the Government's general objective of reducing primary energy consumption by 25% and the specific objective for the Public Administration of achieving a 30% reduction.

TABLE 66

Overall summary of impacts of NEEAP 2016

Programme	Results							
	Energy saved toe		Target 2016 toe		Execution 2016 (1)	Target 2020 toe		Execution 2020 (2)
	Final	Primary	Final	Primary		Final	Primary	
Transports	252 959	252 959	344 038	343 683	74%	408 414	406 815	54%
Residential and Services	267 008	341 147	634 265	836 277	42%	857 493	1 098 072	34%
Industry	177 895	179 812	365 309	377 221	49%	471 309	521 309	34%
State	9 902	14 190	106 380	153 634	9%	205 425	295 452	5%
Behaviour	21 313	32 416	21 313	32 416	100%	21 313	32 416	100%
Agriculture	0	0	30 000	30 000	0%	40 000	40 000	0%
TOTAL NEEAP	729 077	850 524	1 501 305	1 773 231	49%	2 003 954	2 394 064	36%

(1) With regard to final energy.
(2) With regard to primary energy.

FIGURE 2

Expected savings to be achieved (ktoe)

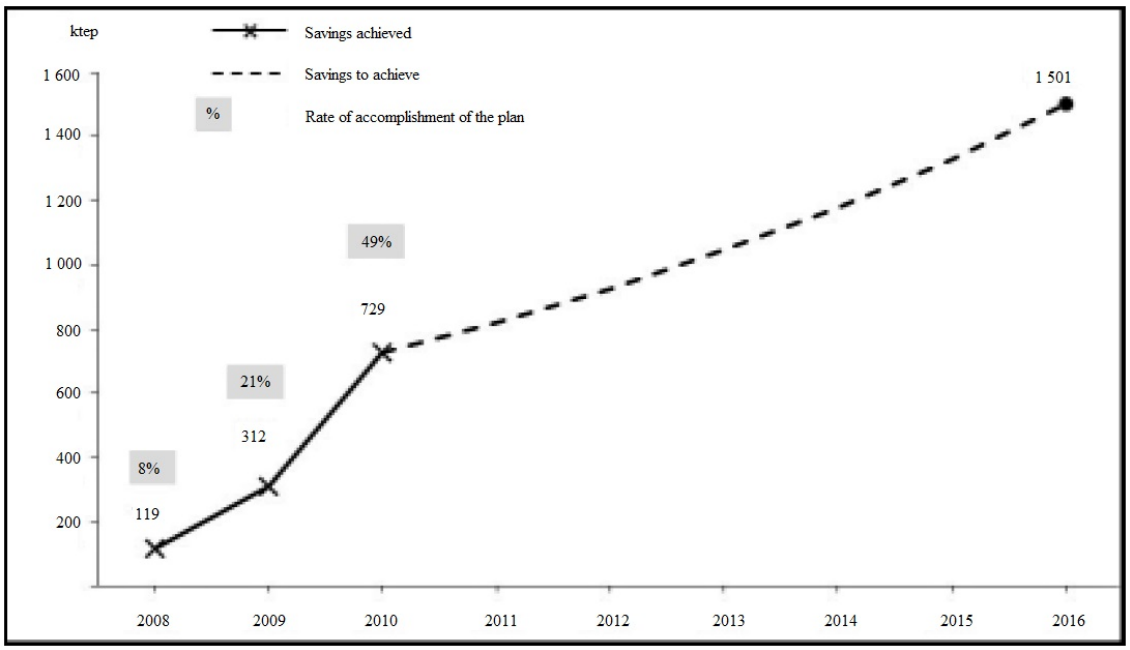


FIGURE 3

Expected primary and final energy consumption (ktoe)

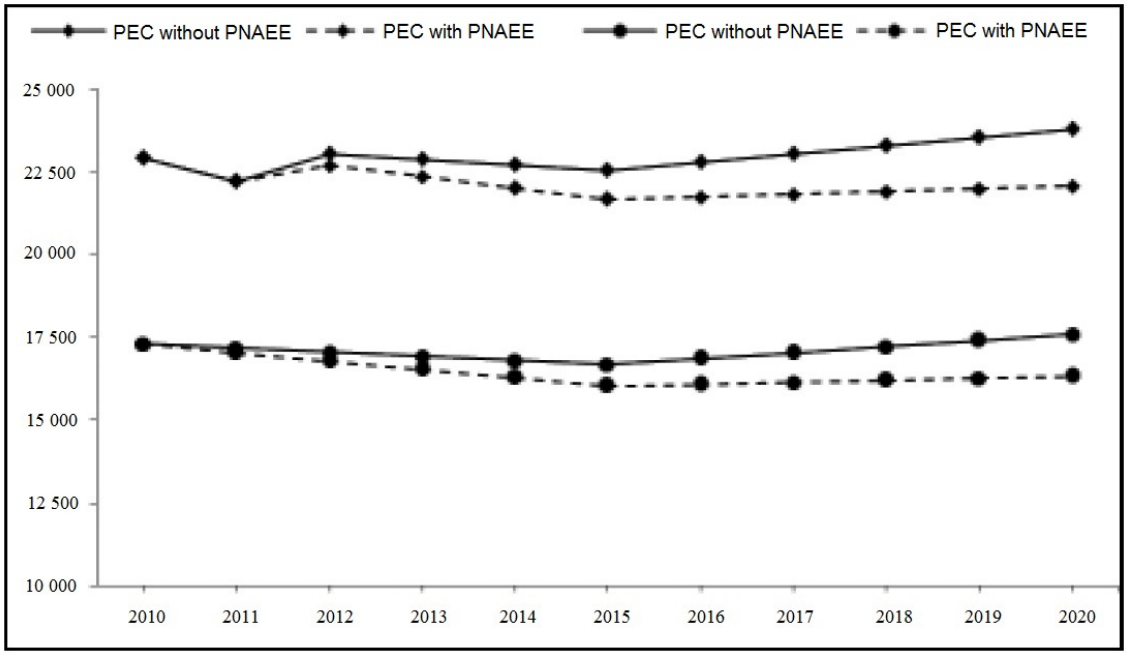
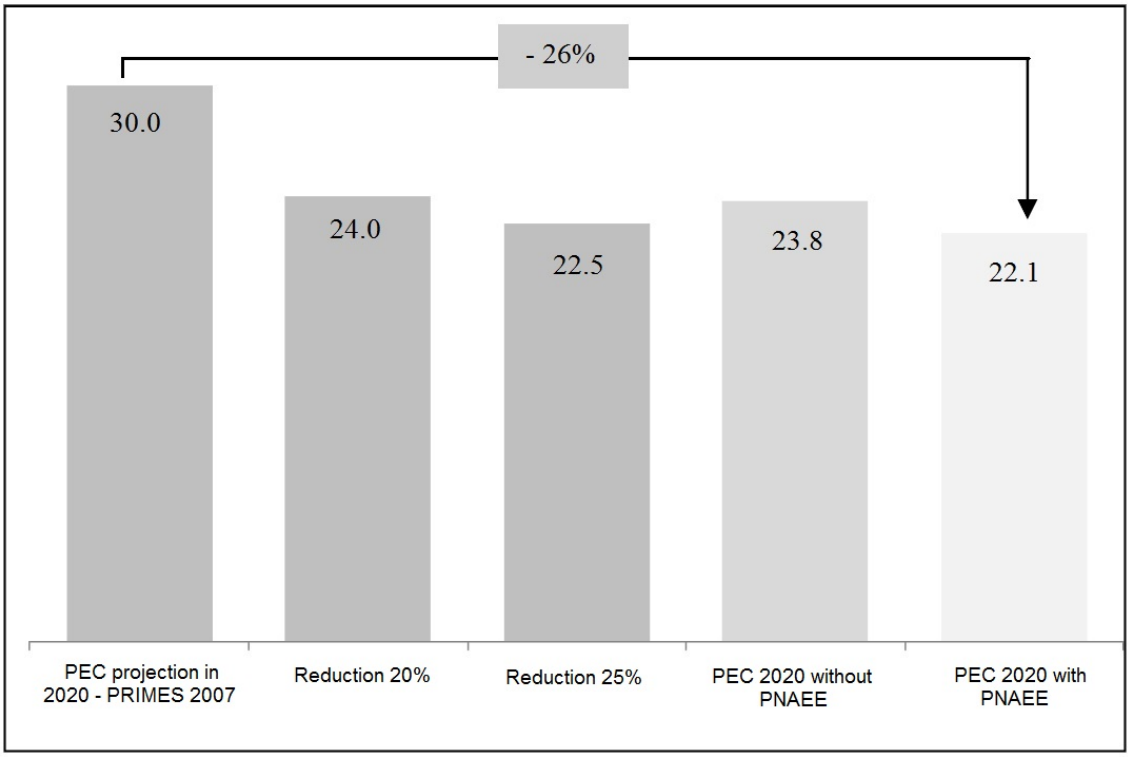


FIGURE 4
Expected primary energy consumption (ktoe)



5. Sources of funding

The present macroeconomic environment, characterised by budgetary restrictions and funding limitations, makes it essential to find new solutions for structuring projects. As a result, the NEEAP 2016 has adapted financial incentive mechanisms to available resources, following the logic of a strict need to comply with targets.

Thus, the NEEAP 2016 will essentially be implemented by means of regulatory measures (e.g. penalties for inefficient equipment, minimum energy performance class requirements, compulsory energy labelling, compulsory energy audits), fiscal differentiation measures (e.g. positive discrimination in terms of taxes such as the IUC, ISV and ISP) and financial support from funds which provide finance for energy efficiency programmes, such as:

a) Energy Efficiency Fund (EEF), created by Decree-Law No 50/2010 of 20 May 2010, regulated by Order No 26/2011 of 10 January 2010, specifically aimed at supporting the measures stipulated in the NEEAP;

b) Fund to Support Innovation (FSI), created by Order No 32276-A/2008 of 17 December 2008, which also approved the respective Management Regulations, later amended by Order No 13415/2010 of 19 August 2010 and by the Order issued by the State Secretary for Energy of 5 July 2012, which expanded the scope of application of the FSI to projects investing in energy efficiency;

c) PPEC - Plan to Promote the Efficient Consumption of Electric Energy, promoted by the Energy Services Regulatory Entity (ERSE) within the framework of the PNAC;

d) Portuguese Carbon Fund (PCF), created by means of Decree-Law No 71/2006 of 24 March 2006, aimed at supporting, among others, projects which result in a reduction of greenhouse gas emissions;

e) National Strategic Reference Framework (NSRF) and other Community financial instruments, such as the *Joint European Support for Sustainable Investment in City Areas* (JESSICA) initiative, focusing on sustainable urban rehabilitation and development.

The DGEG plays an extremely important role in the articulated use of the different funding instruments, it being essential to ensure a suitable coordination with the respective managing entities.

6. Impact

The implementation of the programmes and measures of the NEEAP 2016 has an economic impact on final and primary energy savings. This can be directly ascertained by means of the related aspect of lower imports of fossil fuels, as well as a reduction in greenhouse gas emissions, measured in equivalent CO_2 emissions.

There are also indirect benefits which are not quantified in this Plan, such as the creation of employment associated with the Plan’s implementation, although estimates can be made based on a comparative analysis with similar practices tested at an international level. The improvement of air quality in cities, for example, due to a reduction in the use of individual transport, by switching to soft modes of transport or public transport, has an obvious positive impact on reducing public health costs, which is also reflected in economic activities and productivity.

However, given the complexity of the factors in question, it is not yet possible to assess this impact due to a paucity of data, indicators and a suitable methodology to quantify the results.

The NEEAP 2016 has been analysed for the 2013-2020 period, without considering the effects which have already been recorded for the period between 2008 and 2012, since they correspond to measures and actions which have already been implemented.

The following table, regarding the economic impact on the balance of payments, provides a summary of the benefits which could be achieved by reducing energy imports, if all the targets for the 2016 and 2020 time frames are achieved.

TABLE 67
Impact of NEEAP 2016 on Primary Energy Savings

AREAS	Accumulated Primary Energy Saving (toe)		Economic benefits achieved through primary energy saving (M€)	
	2016	2020	2016	2020
Transports	73 654	136 777	62.5	116.3
Residential and Services	320 932	582 727	159.2	314.9
Industry	117 309	261 397	81.2	202.1
State	112 170	253 988	55.7	137.3
Behaviour	0	0	0	0
Agriculture	30 000	40 000	22.7	34.0
TOTAL	654 056	1 274 889	381.4	804.6

In terms of the impact of the programmes and measures stipulated in the NEEAP 2016 to reduce greenhouse gas emissions, the role of forms of energy in each of the areas considered was identified: Electricity and Petroleum Products.

The figures obtained were later converted into tonnes of equivalent CO2 avoided, in an initial estimate of the impact. A price of €10 per tonne of CO2 was used for this exercise, for the two periods of 2016 and 2020. The calculation of the reduction in greenhouse gases associated with the NEEAP 2016 will be evaluated in detail in the future, within the scope of the PNAC 2020.

TABLE 68
Impact of NEEAP 2016 on CO2 emissions

AREAS	Reduction in emissions of greenhouse gases (tCO2)		Economic benefits achieved through reduction in emissions of greenhouse gases (M€)	
	2016	2020	2016	2020
Transports	227 273	422 441	2.3	4.2
Residential and Services	1 400 941	2 543 735	14.0	25.4
Industry	399 504	890 765	4.0	8.9
State	489 647	1 108 715	4.9	11.1
Behaviour	0	0	0	0
Agriculture	92 571	123 541	0.9	1.2
TOTAL	2 609 936	5 089 197	26.1	50.9

In short, the economic benefits resulting from energy savings and the reduction of associated emissions of greenhouse gases have an extremely positive economic impact for the nation, estimated to be around € 410 M in 2016 and almost € 855 M in 2020.

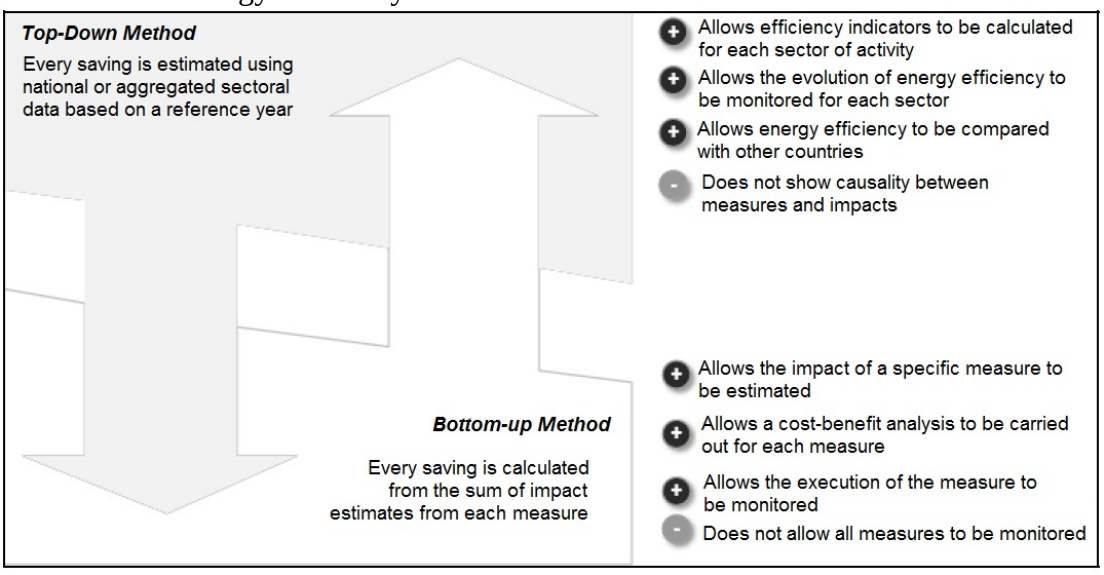
7. Monitoring

The task of monitoring involves verifying compliance with the goals defined for energy efficiency savings for each measure, as well as an ongoing and comparative assessment of the cost-benefit ratio of the different measures. To this end, it is essential to ensure the development and suitability of the statistical variables, namely the quantitative and performance indicators for the measures, for the purpose of the top-down and bottom-up monitoring stipulated in the European Union methodology.

The bottom-up method uses specific methodologies for each measure (when possible), based on a series of criteria and assumptions which make it possible to estimate the impact in terms of primary and final energy resulting from the implementation of the measure. While demonstrating the causal relationship between measures and impacts, this also enables a cost-benefit analysis according to the investments made to promote the measure.

Thus, it is possible to develop and periodically update a merit list of measures which are being implemented.

However, the inherent nature of the bottom-up method does not allow the entire universe of measures to be monitored and the validity of the assumptions for the methodologies developed is liable to jeopardise the veracity of the impact being monitored. The top-down method resolves this monitoring lacuna, by means of a set of energy efficiency indicators which make it possible to monitor, in a sub-sectoral manner, the savings achieved for a reference year. The indicators thus require combined information on sub-sectoral energy consumption as well as the indicators for the activity with which the consumption is associated, eliminating, as far as possible, effects which are not due to energy efficiency.



Source: European Parliament and Council Directive No 2006/32/ECof 5 April; 'Recommendations for a Sustainable Energy Efficiency Strategy and Use of Renewable Energies for Portugal', 2012, A.T. Kearney/INESC Porto

The NEEAP 2008, which essentially used the bottom-up method for monitoring purposes, suffered from said issues, with 24% of the measures it contained still needing to be monitored.

In addition to the selection of aggregate top-down indicators, other indicators will also be considered which could assist the process of monitoring the implementation of the measures.

Top-Down Indicators in the Transport sector

TABLE 69
Top-Down Indicators in the Transport sector

Indicator Code	Indicator	Effects reflected by the indicator
P8	Consumption of energy by passenger cars (goe) per passenger-km (pkm)	Reflects technological improvement, behaviour and increase in occupancy rate of passenger cars
A1	Energy consumption by passenger cars (l) per 100 km driven	Reflects technological improvement and change in behaviour in passenger cars. The difference in relation to the indicator P8 is due to the variation in the occupancy rate and the structure of diesel/petrol consumption
P9	Energy consumption by goods vehicles (goe) per ton-km transported (ton.km)	Reflects technological improvement, fleet management, variation in occupancy rate and change to trucks with greater load capacity
A2	Energy consumption by goods vehicles (toe) per vehicle	Reflects technological improvement and the effect of a change in the average size of vehicles. The increase in the occupancy rate or the increase in load capacity of vehicles may not lead to savings
P10	Energy consumption by passenger rail transport (goe) per passenger-km transported (pkm)	Reflects technological improvement and the variation in occupancy rate of trains
P11	Energy consumption by goods rail transport (goe) per ton-km transported	Reflects technological improvement and the variation in occupancy rate of trains
P12	Share of public transport in the total number of passenger-km transported (%)	Reflects the modal transition to public transport
P13	Share of rail and waterways transport in total of tons-km transported (%)	Reflects the transition of goods traffic to rail and waterways
M5	Energy consumption by (toe) road vehicles per car equivalent	Reflects technological improvement, behaviour and reduction of distance driven in road transport
M6	Energy consumption by rail transport (goe) per ton-km equivalent transported	Reflects technological improvement and the variation in occupancy rate of trains (passenger and goods)
M7	Energy consumption by waterways mode per ton-km equivalent transported (goe /tkm)	Reflects technological improvement and the variation in occupancy rate of waterways mode

Top-Down Indicators in the Residential and Services sector

TABLE 70
Top-Down Indicators in the Residential and Services sector

Indicator Code	Indicator	Effects reflected by the indicator
P1	Energy consumption for heating spaces per m2 adjusted to climate conditions (kgoe/m2)	Reflects the impact of the construction regulation, renewal of equipment, efficiency of heating equipment and behaviour in the consumption of energy for heating spaces
P2	Energy consumption for cooling spaces per m2 adjusted to climate conditions (kgoe/m2)	Reflects the impact of the construction regulation, renewal of equipment, efficiency of air conditioning equipment and behaviour in the consumption of energy for cooling spaces
P3	Energy consumption for heating water per inhabitant (toe/hab)	Reflects technological improvement in equipment and the introduction of solar thermal in the consumption of energy for heating water
P4 - 1	Consumption of electricity (kWh) per refrigerator (kWh/un)	Reflects technological improvement and behavioural changes in the use of refrigerators
P4 - 2	Consumption of electricity (kWh) per clothes washing machine (kWh/un)	Reflects technological improvement and behavioural changes in the use of clothes washing machines
P4 - 3	Insert more equipment	
P5	Consumption of electricity (kWh) for lighting per dwelling	Reflects technological improvement, increase in the number of energy saving bulbs or the number of hours of use of lighting
M1	Consumption of non-electric energy per dwelling adjusted to climate conditions (toe/ dwelling)	Reflects all types of improvements in the consumption of non-electric energy
M2	Consumption of electric energy (kWh) per dwelling (kWh/ dwelling)	Reflects all types of improvements in the consumption of electric power

Top-Down Indicators in the Industry Sector

TABLE 71
Top-Down Indicators in the Industry Sector

Indicator Code	Indicator	Effects reflected by the indicator
P14 – Main sectors	Consumption of energy (Mtoe) per production unit	Reflects all types of improvements but may also incorporate changes in the production mix
M8 – Main sectors	Consumption of energy per added value unit (goe/euro)	Reflects improvements but incorporates several effects which are not due to energy efficiency (variation in profit, product mix or the quality, for example)
P14 – Other Transforming Industries	Consumption of energy (Mtoe) per production unit	Reflects improvements but incorporates several effects which are not due to energy efficiency (variation in profit, product mix or the quality,

Indicator Code	Indicator	Effects reflected by the indicator
		for example)
M8 – Other Transforming Industries	Consumption of energy per added value unit (goe/euro)	Reflects improvements but incorporates several effects which are not due to energy efficiency (variation in profit, product mix or the quality, for example)

Top-Down Indicators in the State Sector

TABLE 72
Top-Down Indicators in the State Sector

Indicator Code	Indicator	Effects reflected by the indicator
P6 – Public Services	Consumption of non-electric energy in public services per m2 adjusted to climate conditions (toe/m2)	Reflects renewal of buildings, renovations in boilers or installation of solar panels, but also a change in non-electrical consumption to electricity
P7 – Public Services	Consumption of electric energy in public services per m^2 (kWh/ m2)	Reflects technological improvement in equipment and in lighting
M3 – Public Services	Consumption of non-electric energy in public services per worker equivalent adjusted to climate conditions (toe/ worker)	Reflects all types of improvements in the consumption of non-electric energy
M14 – Public Services	Consumption of electric energy in public services per worker equivalent (kWh/ worker)	Reflects all types of improvements in the consumption of electric energy

Top-Down Indicators in the Behaviour Sector

TABLE 73
Top-Down Indicators in the Behaviour Sector

Indicator Code	Indicator
P15	Energy consumption at educational facilities
P16	Specific energy consumption at educational facilities
P17	Energy consumption in transport sector
P18	Energy consumption per mode of transport
P19	Energy consumption in household sector excluding exogenic effects (migratory balance, natural growth, etc.)
P20	Energy consumption in services sector.

(1) For the simulation on the energy benefits to be achieved till 2016, an average price of €76.9/Barrel was considered. For 2020, the reduction in oil imports was calculated at an average cost of €86.2 €/Barrel.

PART II

Renewable Energy Strategy - NREAP 2020

1. Context and Objectives

The Renewable Energy Strategy is part of a new vision for the energy sector for 2020, which emphasises synergies resulting from the articulation of strategies for energy demand and supply, the subject of the NEEAP and the NREAP, respectively, ensuring the sustainability of prices.

The recent emphasis on RES and combined cycle natural gas power plants has resulted, in the current decline in demand, in an imbalance between the production capacity and energy consumption, translating into an excess supply with fairly high coverage rates. However, the consequences for the national economy only really became visible from the end of the last decade, due to the accumulation of macroeconomic imbalances and structural weaknesses over the course of many years.

In this scenario, considering an energy intensity of the productive economy which is higher than the European Union average, it is necessary to increase efforts to act directly on final energy, within the scope of the NEEAP, as a consequence of the lower marginal cost of complying with the energy efficiency targets as compared to the marginal cost of complying with the objective of disseminating RES in the general calculations of the final consumption of energy. However, despite an 18% reduction in the installed capacity for RES based technologies being forecast by 2020 as compared to the NREAP 2010, the share of electricity from renewable sources in the new NREAP is higher (60% versus 55%), as is the overall target to be reached, which should be around 35% (as compared to the target of 31%).

In this context, with the same time frame as the NEEAP 2016 and keeping in mind the estimated effects of implementing the measures contained in this plan, the NREAP 2020 has been defined in conformance with the current scenario of an excess supply derived from a reduction in demand, so as to adjust and mitigate the inherent costs. The main objective is to revise the relative weight of each of the RES in the national energy mix and the respective incorporation targets to be achieved by 2020, according to their cost of production (levelized cost of energy) and consequent potential for operating in a market system.

Accordingly, more careful criteria have been established for providing support, which must be aimed at RES with greater technological maturity and economic rationality for Portugal. Support for less mature technologies has been left to national, European and/or international instruments to promote Research & Development (R&D), so as to free electricity consumers from funding additional investments in experimental technologies, without prejudice to projects which, on a case-by-case basis and after a cost-benefit analysis and comparison with international benchmarks, prove to be advantageous for the national economy.

To this end, as can be seen in the European Commission communiqué ‘Renewable Energy: A Decisive Agent in the European Energy Market’, adopted on 6 June 2012, ‘A good example is the ‘NER 300’ system, which uses the revenues from auctions of the EU Emissions Trading Scheme to foment the demonstration and early implementation of innovative technologies for producing energy from renewable sources’, which ensures the existence of specific mechanisms for support for technologies which are still at an R&D phase.

This aim does not undermine the importance of RES in promoting a balanced energy mix, which reinforces supply security and reduces the risk of price fluctuations for certain commodities and the respective impact on the national energy bill. In effect, currently more than 45% of the electricity produced in Portugal is based on the use of RES and about 25% of final energy consumption is met by renewable energy. In fact,

Portugal has one of the best historical records at a European level of compliance with the incorporation of RES into gross energy consumption: in 2010, in light of the 2020 objectives at that time, Portugal reported 34.5% of RES in the context of heating and cooling (as compared to a target of 30.6%), 41.1% for electricity (target of 55.3%), 5.5% for transport (target of 10.0%) and 24.6% in final gross energy consumption (target of 31.0%).

However, the emphasis on RES, in a context of low carbon development, has to be set against the current scenario and recent macroeconomic forecasts. The new forecasts, defined at the end of 2011, envisaged a GDP in 2020 which was at least 8% lower than that assumed in the NREAP 2010, making it necessary to revise assumptions on primary and final energy consumption and, consequently, real needs in terms of energy efficiency and renewable energy for compliance with European goals. Thus, in the actual context, in light of the NEEAP, various measures which were part of the NREAP 2010 needed to be revised, especially measures related to incentives for installing additional RES capacity, above all in the case of technology which was not yet competitive.

The NREAP thus adapts the evolution of future production capacity and technological choices to a logic of economic rationality and the free initiative of promoters, whose investment decisions no longer depend on subsidy mechanisms or guaranteed remuneration and the mitigation of risks, in accordance with the system introduced by Decree-Law No 215-B/2012 of 8 October 2012.

The NREAP 2020

2.1 Goals and Scenarios

Article 4 of the Renewable Energy Directive establishes the obligation of each Member State to approve and notify the Commission of a national action plan for renewable energy, establishing the national objectives for the share of energy derived from renewable sources consumed by the electricity, heating and cooling and transport sectors for the 2020 time frame.

Only the sectoral goal for transport (10%) is binding. The Directive does not envisage specific binding targets for the electricity sector or for the heating and cooling sector.

Article 2 of Decree-Law No 141/2010 of 31 December 2010, which partially transposed said Directive, set out the national targets for energy use from renewable sources in final gross energy consumption and the energy consumption of the transport sector in 2020, corresponding to 31% and 10%, respectively, which has been assumed in the NREAP.

The NREAP establishes the trajectories for introducing RES according to the pace of implementing measures and actions stipulated in each of said sectors:

i) electricity; ii) heating and cooling and iii) transport.

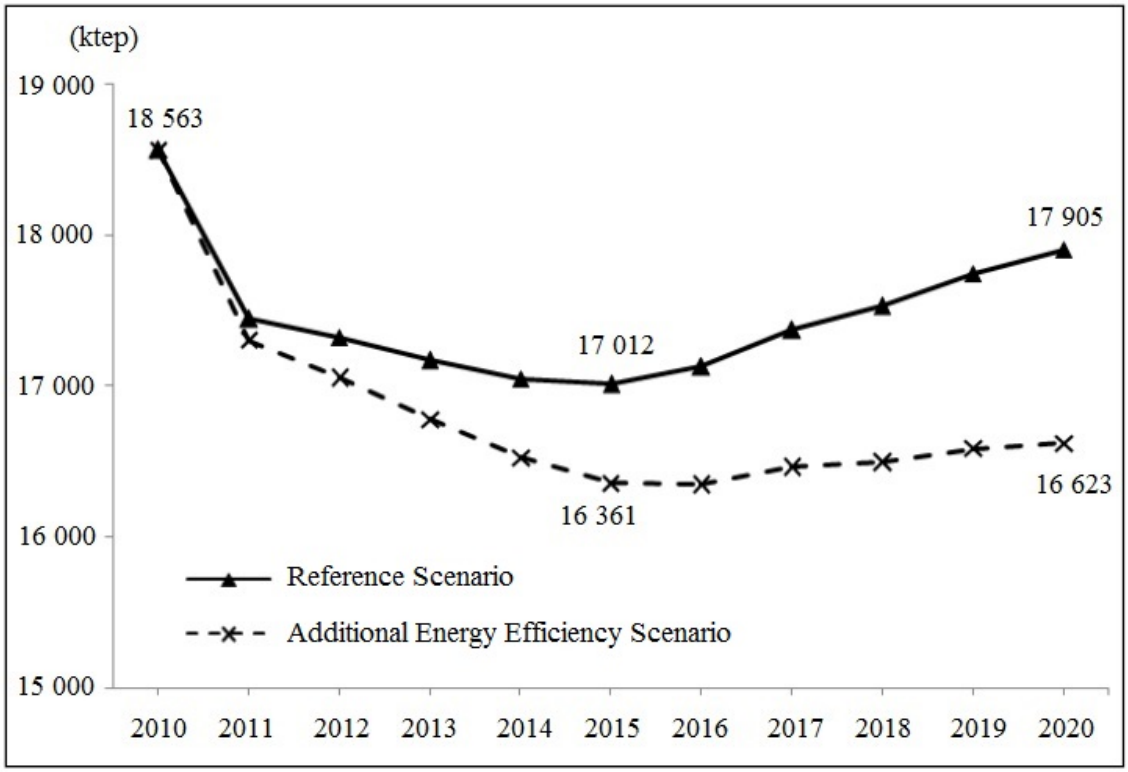
To this end, it identifies and describes the specific sectoral measures, as well as the general measures necessary for achieving national overall commitments.

The Renewable Energy Directive stipulates that the calculation of the overall target for incorporating RES is based on final gross energy consumption, which means that it is necessary to add the self-consumption of electricity plants and energy transmission losses to the final energy consumption.

Moreover, two scenarios are considered: a Reference Scenario, which does not take into account the effects of the energy efficiency measures, and an Additional Energy Efficiency Scenario, which considers the impact of the energy efficiency measures stipulated in the NEEAP 2016. The following figure represents the expected evolution of final gross energy consumption for the two scenarios considered.

FIGURE 5

Expected evolution of gross final energy consumption (ktoe)



The energy consumption forecasts in the Reference Scenario and in the Additional Energy Efficiency Scenario were calculated on the basis of the LEAP model (Long Range Energy Alternatives Planning System), programmed to use 2010 as the reference year, based on all the statistical information of the energy sector available to that date.

CHART 1

Expected gross final energy consumption in heating and cooling, electricity and transport up to 2020 taking into account the effects of energy efficiency and energy saving measures 2010 – 2020 (ktoe)

	2005	2010		2011		2012		2013		2014	
	Base Year	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	Additional energy efficiency
1) Heating and cooling [2]	7 934	6 506	6 506	6 553	6 520	6 564	6 516	6 553	6 477	6 536	6 436
2) Eletricity[3]	4 558	4 842	4 842	4 841	4 758	4 882	4 716	4 909	4 662	4 946	4 619
3) Transport [4] in accordance with Article 3(4)(a)	6 264	6 239	6 239	6 036	6 018	5 867	5 830	5 700	5 644	5 564	5 490
4) Gross final energy consumption[5]	19 588	18 563	18 563	17 451	17 314	17 321	17 063	17 172	16 781	17 049	16 529
Final consumption in aviation	917	1 043	1 043	1 058	1 056	1 057	1 041	1 047	1 024	1 040	1 008
Reduction for aviation limit, Article 5(6)	0	0	0	0	0	0	0	0	0	0	0
TOTAL consumption after reduction for aviation limit	19 588	18 563	18 563	17 451	17 314	17 321	17 063	17 172	16 781	17 049	16 529

(2) Relates to final energy consumption of all energy products except electricity for purposes other than transport, plus the consumption of heating for own use in electricity and heat production facilities and the losses of heat in networks (point '2. Own use by plant' and '11. Transmission and distribution losses' on pages 23 and 24 of Energy Statistics Regulations, OJ L 304 of 14.11.2008).
(3) Per gross consumption of electricity, is understood to mean the national gross production of electricity, including auto-production, plus imports and less exports.
(4) Consumption in transport, as defined in Article 3(4)(a) of Directive 2009/28/EC. For this figure, renewable electricity in road transport must be multiplied by a factor of 2.5, as indicated in Article 3(4)(c) of Directive 2009/28/EC.
(5) As per definition in Article (2)(f) of Directive 2009/28/EC. Includes consumption of final energy plus losses in the network and from own use of heating and electricity in electricity and heat production facilities (NB: does not include the consumption of electricity for hydro produced from pumped storage or for transformation in electric boilers or heat pumps in urban heating facilities).

	2015		2016		2017		2018		2019		2020	
	Reference scenario	Additional energy efficiency	Reference scenario	Additional energy efficiency	Reference scenario	Additional energy efficiency	Reference scenario	Additional energy efficiency	Reference scenario	Additional energy efficiency	Reference scenario	Additional energy efficiency
1) Heating and cooling [2]	6 513	6 389	6 616	6 469	6 716	6 550	6 813	6 629	6 907	6 704	6 998	6 776
2) Eletricity[3]	5 040	4 635	5 100	4 524	5 278	4 608	5 387	4 624	5 432	4 641	5 603	4 660
3) Transport [4] in accordance with Article 3(4)(a)	5 520	5 425	5 476	5 362	5 512	5 378	5 467	5 313	5 478	5 304	5 435	5 242
4) Gross final energy consumption[5]	17 012	16 361	17 130	16 355	17 372	16 469	17 531	16 502	17 746	16 589	17 905	16 623
Final consumption in aviation	1 038	998	1 045	998	1 060	1 005	1 069	1 007	1 082	1 012	1 092	1 014
Reduction for aviation limit, Article 5(6)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL consumption after reduction for aviation limit	17 012	16 361	17 130	16 355	17 372	16 469	17 531	16 502	17 746	16 589	17 905	16 623

2.2 Lines of Action

The lines of action of the NREAP 2020 focus on complying with the goal of 10% in the Transport sector, as well as identifying technologies which must be given system entry priority, if additional capacity for electric energy production from RES proves necessary, keeping in mind the new remuneration systems stipulated in Article 33-G of Decree-Law No 215 -B/2012 of 8 October 2012.

In the Transport sector, the leverage for compliance with the incorporation of RES includes promoting electric vehicles and increasing the incorporation of first generation biofuels (e.g. biodiesel - FAME and bioethanol) or higher generation biofuels (e.g. HVO). Although the potential for electric vehicles is not negligible, the most recent estimate for introducing them into the automobile market reveals a potential contribution of just 1.2% towards the 10% target, making it essential to emphasise the incorporation of biofuels.

Even though it is compulsory to incorporate 10% pursuant to Decree-Law No 117/2010 of 25 October 2010, it is essential that the technical limitations of incorporating first generation biofuels and the costs of higher generations for end users are not overlooked. Therefore, the possibility of increasing the incorporation of first generation bioethanol in petrol to 5% of the energy content will be considered, as will the incorporation of first generation biodiesel in diesel to 10% of volume.

In the Electricity sector, an analysis of the technical potential of the most competitive technologies reveals the existence of a proven potential of 4 GW of RES capacity in addition to expected licensing. At least an additional 1 GW of wind power capacity can be promoted without significant losses of renewable energy, guaranteed by the pumping systems envisaged in the National Programme for High Hydroelectric Potential Dams (PNBEPH). A detailed study of the levelized costs of RES technologies (levelized cost of energy), as well as their evolution until 2020, will make it possible to establish an order of technological merit for the future.

With regard to the Heating and Cooling sector, it is expected that the levels of introducing RES will increase until 2020 without the need for additional public investment, by the natural replacement of equipment and the consequent reduction of energy consumption, or by means of the continuation of some policies which are still in effect, namely the RCCTE and RSECE regulations, which make it compulsory, among other things, to install solar panels in all new constructions and renovations costing more than 25% of the property’s value.

As has been mentioned, in the revised consumption scenario and in light of the NEEAP 2016, various measures which were in the NREAP 2010 have been reformulated, especially measures related to incentives for installing additional RES capacity, above all for technologies which are not yet competitive. These include:

a) Redefining support mechanisms associated with emerging or less mature technologies, considered to still be in a research/demonstration phase;

b) Reassessing the aims for concentrated solar power (CSP) and concentrated photovoltaics (CPV) plants, as they are still relatively costly forms of generating electricity;

c) Revising the goals and objectives of electricity micro and mini-production;

d) Substituting measures requiring large investment in the Heating and Cooling sector (typically subsidisation) with regulatory measures;

e) Continuing efforts to promote measures in the Transport sector, especially those for incorporating biofuels and other renewable fuels;

f) Encouraging the use of biomass, especially forestry resources, for energy purposes, particularly support for biomass equipment for ambient heating and hot water in the domestic and public services sectors. Suitable sources of funding should be found, namely from existing support funds and within the scope of negotiating the future programme framework for 2014-2020.

2.3 Sectors and Measures

The main measures to be implemented by means of the NREAP 2020 to promote the use of RES in different sectors have been summarised in the following chart:

CHART 2

Planned measures and measures underway, by sector

Name	Description	Result expected	Activity and/or target group	State	Beginning and End Dates	
					Beginning	End
Main policies and specific measures for the Heating and Cooling (H&C) sector						
Solar thermal	Promote installation of solar thermal systems in the residential sector and in swimming pools and sports venues, as well as renew solar thermal systems at end of working life.	Residential: 76.200 toe in 2020 and Services: 31.776 toe in 2020.	End user (Residential, Services and State)	E	2003	2020
Green Heating	Promote installation in buildings of more efficient energy systems with better environmental performance fed by biomass for climate control purposes.	157.354 toe in 2020.	End user (Residential, and Services)	P	2010	2020
Record of small renewable systems installers	Create a national system of record of small renewable systems installers for thermal purposes (solar thermal, heat pumps and biomass systems).	Improvement in the quality of premises, improvement in the quality of information provided to clients, establishing of a routine of data collection for	Installers End user State	P	2013	2020

		NREAP.				

Main policies and specific measures for the Electric sector						
General system	Introduction of a general remuneration system which allows an RES electricity producer to work in accordance with the terms applicable to PRO	Promote investment in mature technologies with established merit which makes their market operation viable.	Renewable Energy Producer	E	2012	2020
Market facilitator	Setting up of the a market facilitator, required to acquire energy produced by RES power plants wishing to sell the market facilitator said energy on the market	Create solid conditions to make the actions of smaller operators on the market viable	Renewable Energy Producer	P	2013	2020
Guarantees of Origin	Setting up of the Guarantees of Origin Issuing Entity (EEGO)	Contribute to the economic viability of electricity production project from RES and an increase in transparency through the transaction of guarantees of origin relating to the production of this type of electricity.	Renewable Energy Producer	P	2013	2020
Biomass plants	Setting up of a decentralized network of biomass plants further to tender for power allocation launched in 2006	Reinforce the installed power at biomass plants, promoting the improvement of the electricity production management system and supply security.	Renewable Energy Producer	E	2006	2015
Miniproduc-tion	Reformulating and merger of current microproduction and miniproduction programmes.	Standardize and facilitate administrative procedures. Rationalization of support granted.	End user (Residential, Services and Industry)	E	2012	2013
Single Point of Contact for Electricity	Facilitate licensing procedures for renewable electricity plants.	Reduce licensing times by setting up a Single Point of Contact (Directorate-General of Energy and Geology-DGEG), as a ‘project manager’ and an electronic platform to facilitate licensing processes and respective information.	State	E	2007	2013

National programme for dams with high hydroelectric potential (PNBEPH)	Development of PNBEPH, of new hydro projects underway, increase in planed power and the installation of pumping systems.	Reinforce hydro power and increase installed reversible capacity, promoting improvement in the electricity production management system and supply security.	Renewable Energy Producer	E	2007	2020
Offshore Energy Pilot Zone	Implementation of a pilot zone (S. Pedro de Moel) with the expansion of offshore wind power, saline gradient, temperature gradient and ocean currents, as well as changes to the concession model and electrical infrastructure to accommodate demonstration projects.	Create logistic conditions and network connection for future promoters of marine energy demonstration projects, with an overall capacity of up to 250 MW before 2020.	Renewable Energy Producer	E	2008	2020
Over – equipping of wind farms	Increase power through the over-equipping of existing wind farms.	Increase installed capacity for production from RES by approximately 400MW economically and efficiently and improving the electricity production management system and supply security.	Renewable Energy Producer	E	2010	2020
Promotion of forest biomass	Allocation of incentives to be awarded to forest biomass plants within the scope of a framework which binds to specific conditions, through voluntary agreements with plant promoters.	Design a commitment framework with biomass plant promoters which allows projects to be achieved, binding the promoters to support forestry policy measures, organization of the logistics chain, enhancing the local economy, social responsibility and compliance with construction times in the implementation of projects.	Renewable Energy Producer	E	2011	2017
Main policies and specific measures for the sector of transports						
Biofuels	Promote the use of endogenous resources and waste to produce	Significant increase in the use of endogenous	Farmers, Forestry, Municipal	E	2010	2020

	biofuels and solutions relating to second generation raw material (non-food cellulosic material and ligno-cellulosic material)	resources in production of biofuels.	Authorities, Other biofuel operators			
Electric Mobility	Rationalization of the charging infrastructure to current needs, more specifically in areas of high demand, preferentially covered and with surveillance.	Increase the use of electric vehicles.	End user/ Municipal Authorities	E	2010	2020
Policies and common measures between the three sectors						
Community Support Framework 2014-2020	Identify financing requirements and suitable instruments to support RES projects based both on innovative technologies and on mature technologies.	Increase the use of Renewable Energies.	Renewable Energy Producer / Companies	E	2012	2020
Biomethane	Assess the potential of biomethane in Portugal and its alternative applications and regulate the specifications required for the injection of biomethane into the Natural Gas (NG) network.	Allow the use of biomethane for purposes other than the production of electricity.	State and SCT	E	2012	2015
Competence Centre in the field of biomass	Promote the Biomass for Energy Centre.	Promote a research, certification and general coordination centre for the biomass sector. Growth in the sustainable use of biomass.	CBE Forestry	E	2011	2015
Geothermal	Characterize national territory in terms of geothermal resources and promote pilot projects in scientific research and promote the assessment of the application potential of high-enthalpy and depth geothermal power and low-enthalpy geothermal power to use energy from aquifers (hydrogeology energy) or geological formations.	Mapping of potential of national geothermal resources and promotion of their use. Obtaining a tool for the selection of the most suitable sites for the installation of projects to use geothermal resources.	State and SCT	E	2012	2014
Hydrogen	Draw up the Hydrogen Road Map.	Identify the potential of hydrogen and define road map for its respective development and use.	SCT	E	2011	2014

Key: E – Existing; P – Programmed

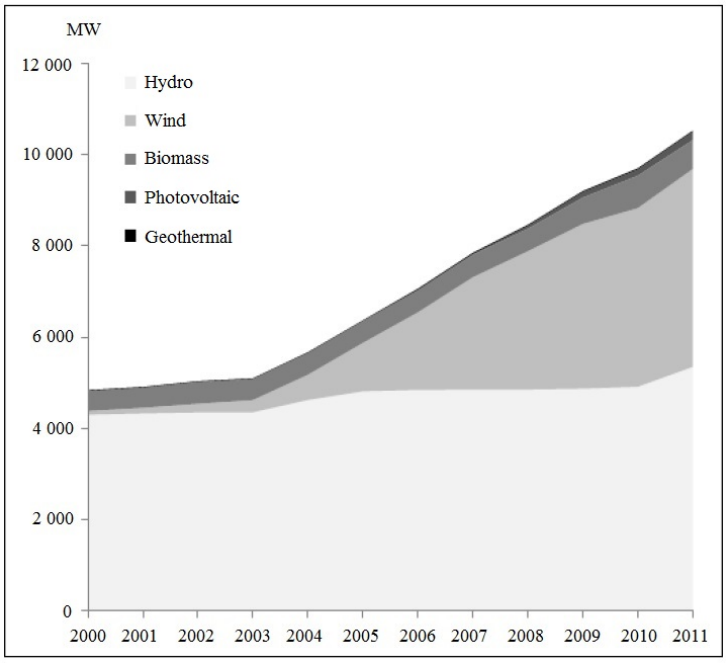
3. Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the Electricity, Heating and Cooling and Transport Sectors

Portugal's goal for the share of renewable energy in the final gross energy consumption for 2020 is 31.0% – the fifth highest in the EU – and essentially reflects two aspects: i) the progress that has already been achieved in promoting RES, which makes Portugal a leader in terms of installed thermal and electric capacity and ii) the potential which exists for developing new projects.

3.1 Electricity

The contribution of RES towards electricity production has undergone significant developments over the course of the last decade, as can be seen from the graphs in figures 6 and 7. Hydro-energy plays a very important role in the electricity production mix in Portugal, although new RES have also become important, such as wind energy and, more recently, solar energy. In 2011, Portugal had 10 623 MW of installed RES capacity, 119% more than the figure recorded in 2000 and 10% above the capacity installed in 2010. This RES installed capacity made it possible to generate 48% of the national total gross production of electricity, there being a fairly significant increase as compared to the beginning of the decade, when only 31% of the gross production of electricity was satisfied by means of RES.

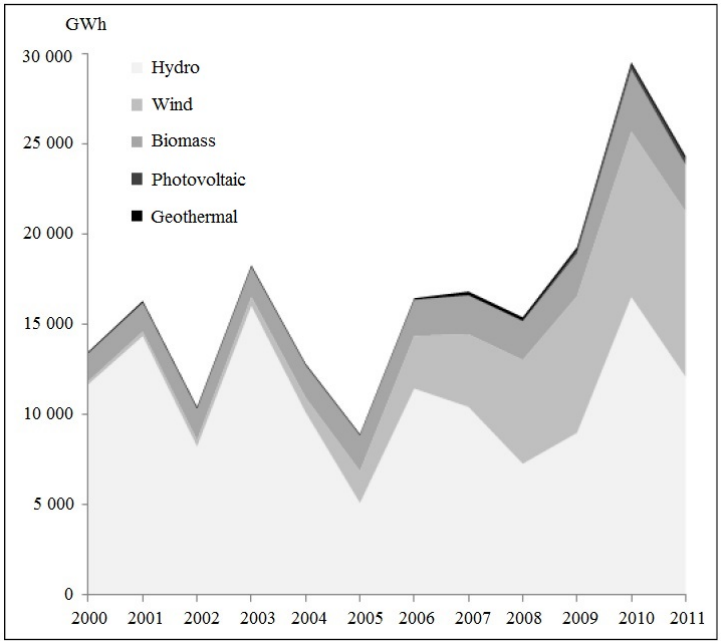
FIGURE 6
Evolution of RES installed power in Portugal



Source: DGEG

FIGURE 7

Evolution of real electrical power production from RES in Portugal



Source: DGEG

The following table reflects the estimates for the total contribution of the different RES technologies towards compliance with the targets established for Portugal, keeping in mind the availability of resources, the maturity of technologies, instruments and specific commitments applicable to each RES and the respective schedule for introducing the various measures to promote RES. The estimated values indicate an annual average growth of 5% for the period 2010-2020 for installed capacity and 1% for the production of electric energy.

CHART 3

Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity 2010-2014

	2005		2010		2011		2012		2013		2014	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro :	4 816	5 118	4 898	16 547	5 332	12 114	5 337	11 482	5 603	11 889	5 861	12 186
< 1MW	28	33	34	93	34	78	34	89	34	89	34	89
1MW – 10 MW	295	348	320	995	323	742	328	741	328	741	328	741
>10MW	4 493	4 737	4 544	15 458	4 975	11 294	4 975	10 651	5 241	11 059	5 499	11 355
Of which by pumping[6]	537	387	1 088	2 769	1 088	1 900	1 088	1 567	1 344	1 936	1 515	2 182
Geothermal	18	71	29	197	29	210	29	226	29	226	29	226
Solar:	3	3	134	214	172	277	210	326	280	439	359	572
Photovoltaic	3	3	134	214	172	277	210	326	268	415	325	504
Concentrated solar power	0	0	0	0	0	0	0	0	12	24	34	68
Tide, Wave, Ocean	0	0	0	0	0	0	0	0	0	0	0	0
Wind:	1 063	1 773	3 914	9 182	4 378	9 162	4 409	10 420	4 507	10 567	4 742	11 034
Onshore	1 063	1 773	3 914	9 182	4 378	9 162	4 407	10 418	4 505	10 564	4 740	11 030
Offshore	0	0	0	0	2	0	2	2	2	3	2	4
Biomass:	476	1 976	713	2 902	711	3 220	734	4 179	734	4 179	754	4 291
Solid	178	934	679	2 802	662	3 059	685	3 836	685	3 836	705	3 948
Biogas	9	34	34	100	49	161	49	343	49	343	49	343
Bioliquids[7]	287	1 008	0	0	0	0	0	0	0	0	0	0
TOTAL	6 372	8 925	**9 688**	**29 042**	**10 623**	**24 983**	**10 720**	**26 633**	**11 153**	**27 301**	**11 746**	**28 309**
Of which in CHP	369	1 304	482	1 635	466	1 734	466	2 609	466	2 618	466	2 618

Biomass	369	1 304	482	1 635	466	1 734	466	2 609	466	2 618	466	2 618
Solid	76	288	476	1 627	459	1 722	459	2 570	459	2 570	459	2 570
Biogas	4	8	6	8	7	12	7	38	7	48	7	48
Bioliquids	289	1 008	0	0	0	0	0	0	0	0	0	0

(6) All installed capacity refers to reversible plants.

(7) Only takes into account those which meet sustainability criteria, See No 1, last paragraph, Article 5 of Directive 2009/28/EC.

	2015		2016		2017		2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro :	7 065	12 393	7 071	12 407	8 909	14 476	8 919	14 584	8 934	14 516	8 940	14 529
< 1MW	34	89	34	89	34	89	34	89	34	89	34	89
1MW – 10 MW	328	741	334	755	335	757	345	780	360	814	366	827
>10MW	6 703	11 563	6 703	11 563	8 540	13 630	8 540	13 715	8 540	13 613	8 540	13 613
Of which by pumping[6]	2 709	3 901	2 709	3 901	4 004	5 766	4 004	5 766	4 004	5 766	4 004	5 766
Geothermal	29	226	29	226	29	226	29	226	29	226	29	226
Solar:	417	661	474	751	532	840	589	929	647	1 018	720	1 139
Photovoltaic	383	593	440	683	498	772	555	861	613	950	670	1 039
Concentrated solar power	34	68	34	68	34	68	34	68	34	68	50	100
Tide, Wave, Ocean	1	1	6	9	6	9	6	12	6	15	6	15
Wind:	4 842	11 180	4 942	11 330	5 042	11 469	5 142	11 605	5 242	11 731	5 300	11 671
Onshore	4 840	11 176	4 915	11 260	5 015	11 399	5 115	11 534	5 215	11 661	5 273	11 601
Offshore	2	4	27	70	27	70	27	70	27	70	27	70
Biomass:	784	4 459	814	4 641	814	4 641	814	4 641	814	4 641	828	4 719
Solid	735	4 116	755	4 228	755	4 228	755	4 228	755	4 228	769	4 306
Biogas	49	352	59	413	59	413	59	413		413	59	413
Bioliquids[7]	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	13 138	28 920	**13 337**	**29 364**	**15 332**	**31 661**	**15 500**	**31 997**	**15 672**	**32 147**	**15 824**	**32 300**
Of which in CHP	466	2 618	466	2 618	466	2 618	466	2 618	466	2 618	471	2 646
Biomass	466	2 618	466	2 618	466	2 618	466	2 618	466	2 618	471	2 646
Solid	459	2 570	459	2 570	459	2 570	459	2 570	459	2 570	464	2 598
Biogas	7	48	7	48	7	48	7	48	7	48	7	48
Bioliquids	289	1 008	0	0	0	0	0	0	0	0	0	0

(8) All installed capacity refers to reversible plants.

(9) See foot note on previous page.

It must be emphasised that Chart 3 shows an estimate of the total contribution of each RES based technology towards achieving the binding 2020 targets, but does not include the projects to produce energy based on renewable sources which will be implemented pursuant to Decree-Law No 215-B/2012 of 8 October 2012, without extra costs for the National Electricity System and which will be disseminated with the assistance of Community funding.

The target for incorporating RES in Portugal's final gross energy consumption in 2020 will be achieved by incorporating 59.6% of renewable energy in the electricity sector. To this end, in 2020, Portugal will record a total of 15 824 MW of installed capacity. When compared to the figure recorded in 2011 (when there was a total installed renewable capacity of 10 623 MW), this corresponds to an increase of 49%. In terms of electric energy produced from RES, 29% growth is expected by 2020, corresponding to 32 300 GWh, as compared to the 24 983 GWh recorded in 2011.

FIGURE 8
Estimated evolution of RES installed capacity

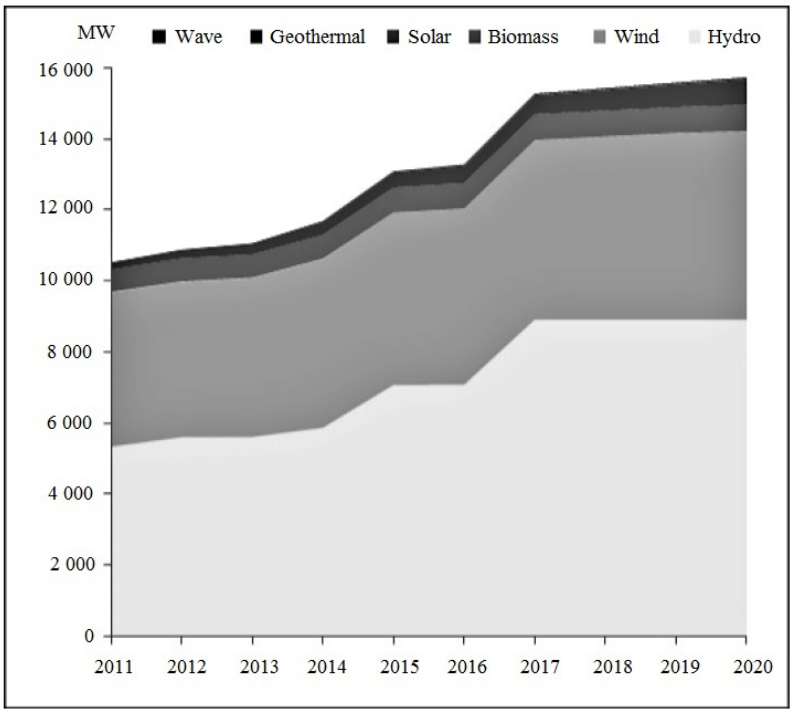


FIGURE 9
Estimated evolution of RES electricity production

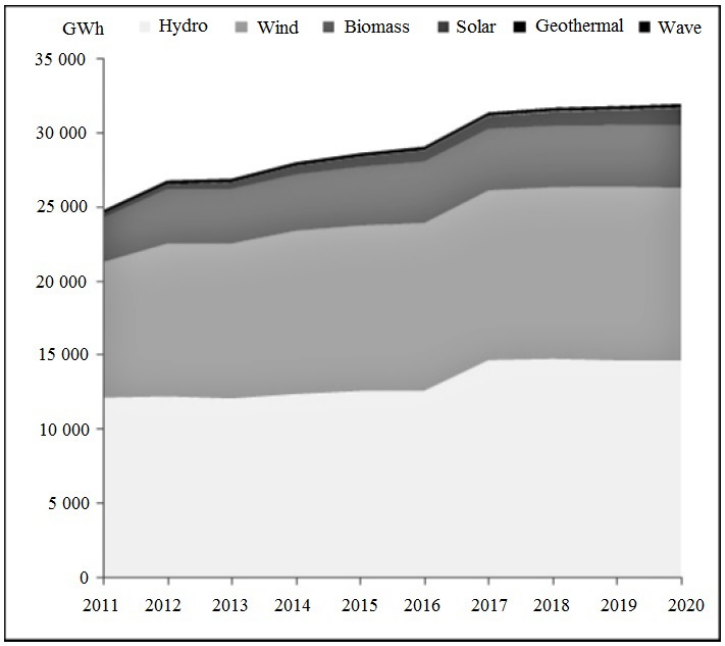
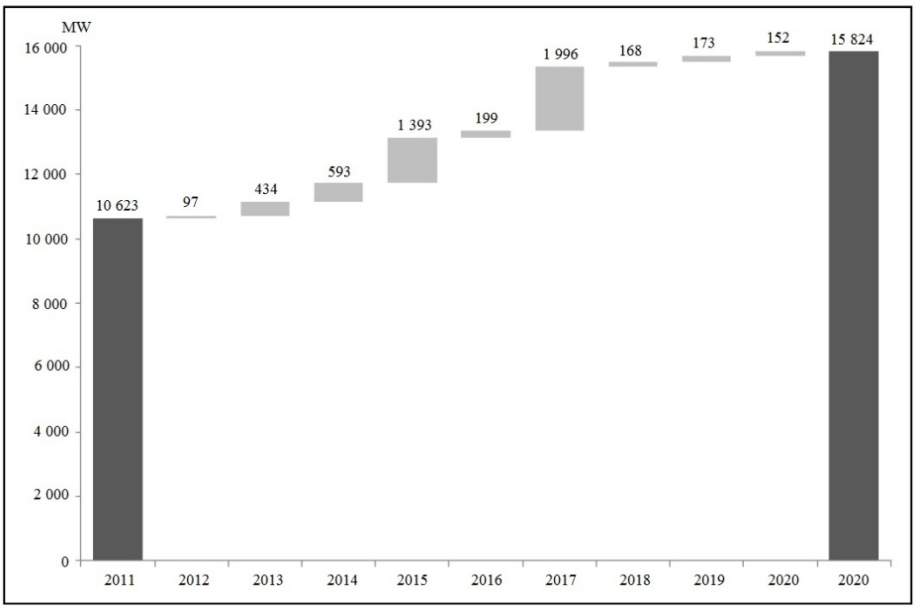


FIGURE 10
Evolution of entry of new capacity from RES into the national electricity production system



3.1.1 Wind Energy

There has been substantial development of wind energy in Portugal in recent years, wherein the installed capacity increased from 1 063 MW in 2005 to 4 378 MW in 2011. This growth in installed capacity will tend to slow by 2020, given the decline in demand for energy. In this scenario, it is expected that 5 300 MW of wind energy capacity will be installed by 2020, of which 5 273 MW relate to onshore wind potential.

Part of the emphasis on wind energy is due to the possibility of being able to create synergies between reversible hydro and wind energy, so as to optimise indigenous resources and ensure more effective management of the electricity production system. The installation of more than 400 MW of capacity is also planned, by simplifying the procedures for installing over-equipment in existing wind farms, pursuant to Decree-Law No 51/2010 of 20 May 2010, so as to increase the respective availability, with benefits for the management of the network infrastructure.

The same law also reviews the respective remunerative systems and makes it obligatory to install equipment aimed at supporting voltage sags.

The operation of offshore wind potential is expected to play a negligible role in electricity production by 2020, insofar as this resource still depends on technological development and the economic viability of the respective equipment and systems, including supporting infrastructure. Among existing technologies, floating wind turbines are the most suitable for the conditions of the Portuguese coast, which has a high bathymetry. This technology is already in the test phase with a 2MW prototype having been installed, which has given good results to date.

This project (Windfloat) is expected to continue during the period covered by this Plan, with the installation of a capacity of 27 MW, which will essentially serve for research

purposes, technological development and pre-sales demonstrations. Funding for the purpose has already been secured through the NER300 financial instrument, managed jointly by the European Commission, the European Investment Bank and Member States.

3.1.2 Hydropower

Portugal has focused on hydropower since the 1940s but has not yet suitably harnessed its hydro potential. The PNBEPH was prepared in 2007 with a view to changing this situation, increasing the nation's hydropower capacity.

The PNBEPH sought to identify and define priorities for investments to be made by 2020 for hydroelectric projects. Currently, the installed capacity of this RES technology is 4 975 MW.

The implementation of the PNBEPH, as well as an increase in the capacity of some existing dams, indicates an increase in the installed reversible capacity, which would enable a better management of wind production in off-peak hours.

Table 74 shows the timeline with the dates when new dams are expected to become operational by 2020. A total installed capacity of 8 536 MW has been envisaged, of which 4 004 MW relates to reversible capacity.

TABLE 74
Chronogram of entry into service of new hydro power plants and power strengthening

New hydro power plants	Type	Net Power (MW)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Alqueva II	Reversible	256											
Ribeiradio/Ermida	Non-reversible	74											
Baixo Sabor	Reversible	171											
Foz-Tua	Reversible	251											
Venda Nova III (Frades)	Reversible	736											
Salamonde II	Reversible	207											
Fridão	Non-reversible	238											
Bogueira	Non-reversible	30											
Girabolhos	Reversible	355											
Gouvães	Reversible	660											
Alto Tâmega (Vidago)	Non-reversible	127											
Daivões	Non-reversible	118											

Source: DGEG

With regard to mini-hydro plants (up to 10 MW), Portugal aims to achieve an installed capacity of 400 MW by 2020. Particularly, a simplified system for the attribution of connection points and small and medium capacity plants integrated into water supply systems, waste water systems and irrigation canals is expected to be introduced in the near future.

3.1.3 Solar Energy

Emphasis on solar energy plays an important role in increasing the decentralised production of electricity, since its production cycle is suitable for periods of greater energy consumption, as well as because of Portugal's potential in terms of the availability of this resource and the country's capacity for research and technological development (R&TD). In this sense, in addition to continuing the micro-production

programme, a programme for mini-production was created in 2011, with a view to installing about 250 MW by 2020, aimed essentially at the services sector (schools, public buildings and large distribution warehouses) and industry, for a range of capacities of up to 250 kW, in keeping with the respective technologies.

The expansion of mini-production to higher capacities can be examined according to the evolution of demand and technological evolution. Furthermore, these two systems are expected to be merged in order to improve operations and capacity supply of the Express Renewables Programme and with a view to installing an additional 80MW in micro-production by 2020, so as to simplify procedures and rationalise the associated costs.

The construction of solar farms with higher capacities will depend on the evolution of the costs of the respective technologies. Nevertheless, 75 tenders had been launched by the end of 2010 for 2MW plants. Of these, 70 projects were approved, for a total capacity equivalent to 140 MW.

Moreover, pre-commercial concentrated photovoltaic solar units are expected to be installed by 2015, with a view to demonstrating the technology's economic viability.

With regard to concentrated thermoelectric solar panels, capacity of around 50 MW is expected to be installed by 2020.

3.1.4 Biomass

Biomass plays an important role in the production of energy in Portugal. Currently, the installed capacity is about 662 MW, of which 459 MW are derived from cogeneration and 117 MW from dedicated plants. Portugal is expected to have a total installed capacity of 769 MW by 2020.

The 12 plants which have already been adjudicated by means of tenders to allocate electricity production capacity for forestry biomass plants will contribute towards this increase in capacity. These plants are currently in different stages of implementation and some of them are already operational. The majority of these plants are expected to be operational by 2015.

The capacity allocated to dedicated plants will be reconciled with the availability of forestry biomass, the concentration of capacity being streamlined to obtain economies of scale, whenever justifiable, safeguarding inter-sectoral and territorial balances.

3.1.5 Biogas

It is important to promote the use of biogas in a more rational manner and in articulation with agricultural and environmental policies. The use of biogas in plants exclusively dedicated to the production of electric energy was the predominant solution in the past to make use of this resource. By 2020 Portugal is expected to have an installed capacity of 60 MW. It is essential to note, however, that there have been some limitations in the use of heat close to the source where the biogas is produced, partly due to the isolated location of these plants, associated with Waste Water Treatment Plants (WWTP), landfills or agricultural and cattle breeding farms which, as such, do not have consumers nearby to use the heat generated to substitute thermal consumption from other non-

renewable sources. Therefore, the efficiency of this type of project can be used better by means of cogeneration systems and hence part of these 60 MW could also be allocated to such plants.

The injection of biogas, in the form of biomethane, into the Natural Gas network has currently already been envisaged in Decree-Law No 231/2012 of 26 October 2012, which amended Decree-Law No 140/2006 of 26 July 2006 and defined the technical, quality and safety requirements for biogas, as well as the applicable procedures for the licensing of the respective treatment facilities and the injection of biogas into the National Natural Gas System (SNGN) infrastructure, as well as the respective procurement system by means of legislative orders.

Pioneering and demonstration projects could be developed according to the results obtained after studies which will be carried out to assess the potential of biogas.

3.1.6 Ocean Energy

Given the potential for harnessing ocean energy available along Portugal's coast, it is important to promote this resource, proceeding with the installation of the first prototypes.

In an initial phase, a pilot zone was created to develop projects based on the use of wave energy. However, the implementation of these projects has been conditioned by the concession model defined in Decree-Law No 238/2008, of 15 December 2008, especially with regard to the responsibility for the costs related to investments in network infrastructure, as well as by the as yet experimental level of development of the associated technologies.

In order to overcome these obstacles, the use of a pilot zone for other RES is being analysed, such as offshore wind, salinity gradient, temperature gradient and ocean currents, as is a change in the concession model.

Outside the pilot zone, a nearshore plant is operating on the island of Pico, in the Azores, with 100% national technology. This plant became fully operational in 2005.

A pilot project, located off the coast of Peniche, is also operational, based on the Waveroller technology.

3.1.7 Geothermal Energy

In Portugal, the potential for geothermal energy is limited to the region of the Azores, which contributes towards the security of the archipelago's energy supplies.

Currently, the island of São Miguel has an installed capacity of 29 MW. After the prospection tasks carried out at the Ribeira Grande geothermal field, a project is currently being analysed to expand the existing installed capacity. Studies are also underway on the island of Terceira, which could lead to the installation of a geothermal plant.

The Enhanced Geothermal Systems (EGS) technology, which makes it possible to use the thermal energy of high temperature rocks (dry rocks) at great depths to produce electric energy, could be tested in Portugal.

3.2 Heating and Cooling

In the heating and cooling sector an increase of 9% by 2020 is forecast, as compared to the figure recorded in 2010, with solar heating providing the biggest contribution, followed by biomass.

In this area, it is important to note the important role to be played by new regulations concerning the energy certification of buildings, which could give a significant boost to promoting ambient and hot water heating technologies, based on the use of RES, especially by using solar heating panels, biomass boilers and heat recovery units and heat pumps.

CHART 4

Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling 2010-2020 (ktoe)

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Geothermal (excluding heat pumps)	0	10	10	10	10	11	11	11	11	11	11	11
Solar	20	48	62	69	77	88	99	111	122	134	146	157
Biomass:	2 508	2 179	2 190	2 203	2 199	2 196	2 192	2 204	2 216	2 229	2 241	2 262
solid	2 500	2 168	2 178	2 190	2 187	2 184	2 180	2 192	2 204	2 2016	2 229	2 250
biogas	9	10	12	12	12	12	12	12	12	12	12	12
bioliquids[10]	0	0	0	0	0	0	0	0	0	0	0	0
RES in heat pumps: - aerothermal - geothermal - hydrothermal	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2 529	2 241	2 262	2 282	2 286	2 294	2 303	2 326	2 350	2 374	2 398	2 431
Of which in H&C[11]	0	0	0	0	0	0	0	0	0	0	0	0
Of which biomass in family households	1 161	706	706	719	717	715	713	722	730	739	748	757

(10) Only takes into account those which meet sustainability criteria, See No 1, last paragraph, Article 5 of Directive 2009/28/EC.
(11) Heating and/or cooling in the total consumption of heating and cooling from renewable energies (RES-H&C).
(12) Of total consumption in heating and cooling from renewable energies.

** A contribution from renewable heat pumps, which is currently not quantifiable, is expected as of 2012. A definition of the concept by the European Commission is presently being studied.*

3.2.1 Solar Heating

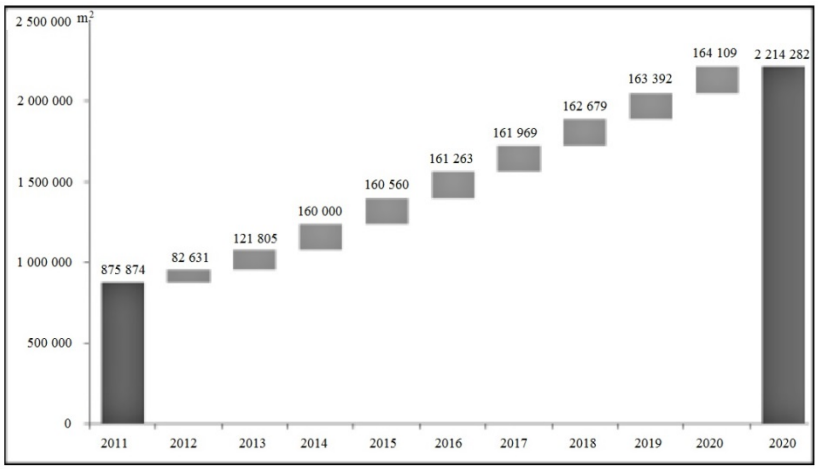
Close to a million m^2 of solar heating panels are currently installed, two-thirds of which are in the residential sector and the remainder in the services sector.

The efforts which have been made to promote this technology have enabled good results, reflected in the increased expansion of equipment installed in recent years. The measures to encourage investment in this area have contributed towards these results. In

this regard, the measures currently in effect within the scope of the NSRF and the EEF are especially worthy of note.

Approximately 2 214 282 m^2 are expected to be installed by 2020, which corresponds to an AAGR of 11.5% between 2010 and 2020.

FIGURE 11
Estimated evolution of amount of new thermal solar collectors



3.2.2 Biomass

Among RES, biomass represents the largest percentage of energy consumption in the heating and cooling sector (accounting for 97% in 2010). It also plays a significant role in final energy consumption, corresponding to 7% of the total in 2010.

The use of biomass is expected to increase by 2020, especially in the domestic sector, as a result of the expected increase in fossil fuels and electricity.

The use of more efficient biomass systems, with a better environmental performance, will gradually be promoted, such as heat recovery units and pellet boilers, which will contribute towards stabilising consumption of this RES.

3.2.3 Biogas

As has been mentioned in 3.1.5, the gradual integration of biogas, in the form of biomethane, into the natural gas network will also lead to a greater use of this RES in terms of thermal energy, both by using the heat from cogeneration plants as well as industrial and domestic consumption.

3.2.4 Heat pumps

The contribution of aerothermal, geothermal and hydrothermal energy captured by heat pumps for the purpose of calculating the contribution of these technologies towards the share of RES in the heating and/or cooling sector is currently zero, since the definition contained in the Renewable Energy Directive does not as yet allow their inclusion. The European Commission is expected to issue directives on the way Member States should

estimate the parameters for the different technologies and uses of heat pumps, considering different climatic conditions.

Future regulations for energy efficiency in buildings could promote the installation of this equipment to meet the growing need to improve the energy performance of buildings.

3.3 Transport

The emphasis on the use of renewable energy sources in the transport sector promotes a reduction in oil dependence and, consequently, a reduction in the foreign trade balance as well as a reduction in CO2 emissions, thus contributing towards combating climate change. Moreover, the diversification of sources of supplies, by producing fuels indigenously, results in greater security of supplies, essential in the transport sector.

CHART 5

Estimation of total contribution expected from each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector 2010-2020 (ktoe)[13]

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biofuels substitutes for petrol	0	0	0	0	0	0	29	29	28	27	27	26
Of which Biofuels[14] Article 21(2)	0	0	0	0	0	0	0	1	1	1	1	1
Of which is imported[15]	0	0	0	0	0	0	0	0	0	0	0	0
Biofuels substitutes for diesel	0	326	311	303	293	308	379	380	458	455	506	503
Of which biocombustíveis[16] Article 21(2)	0	4	5	5	4	5	6	10	12	12	13	13
Of which imported[17]	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen from renewables	0	0	0	0	0	0	0	0	0	0	0	0
Renewable electricity	12	16	20	23	25	28	31	34	39	43	46	50
Of which road transport	0	0.0	0.05	0.1	0.1	0.1	0.2	0.3	0.4	0.7	1.0	1.4
Of which non-road transport	12	16	20	23	25	28	30	34	39	42	45	48
Others (such as biogas, Vegetable oils, etc.)	0	0	0	0	0	0	0	0	0	0	0	0
Of which biocombustíveis[18] Article 21(2)	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	12	342	331	326	318	336	439	443	526	525	578	578

(13) Only biofuels which meet sustainability criteria are taken into account.
(14) Biofuels referred to in Article 21(2) of Directive 2009/28/EC.
(15) Of the total amount of bioethanol/bio-ETBE.
(16) Biofuels referred to in Article 21(2) of Directive 2009/28/EC.
(17) Of the total amount of biodiesel.
(18) Biofuels referred to in Article 21(2) of Directive 2009/28/EC.

The Transport sector target will be achieved by 2020, in real terms, with 4.5% of petrol substitute biofuels, 87% of diesel substitute biofuels and 8.5% electricity from renewable sources.

FIGURE 12
Estimated evolution of the contribution of different RES in the Transport sector (ktoe)

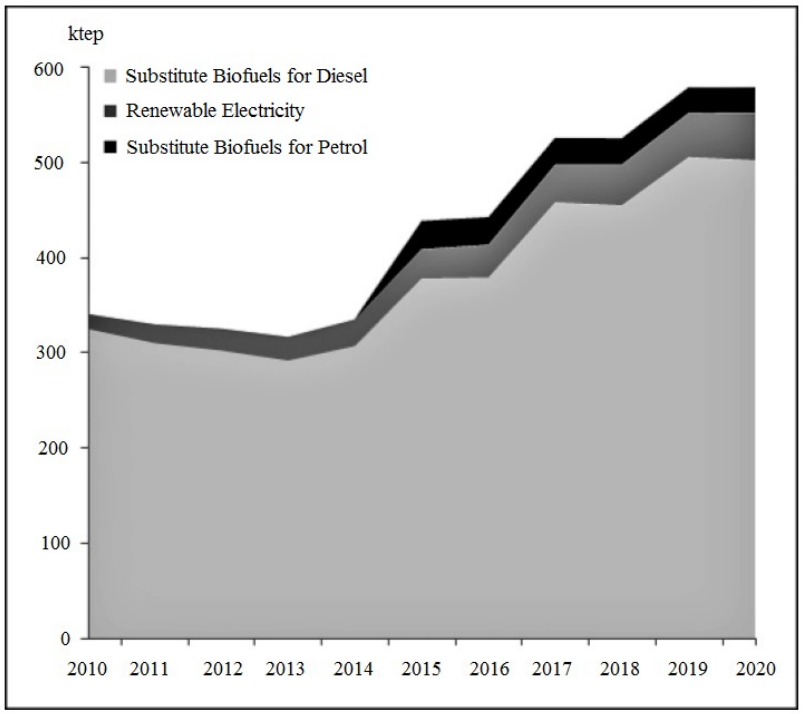
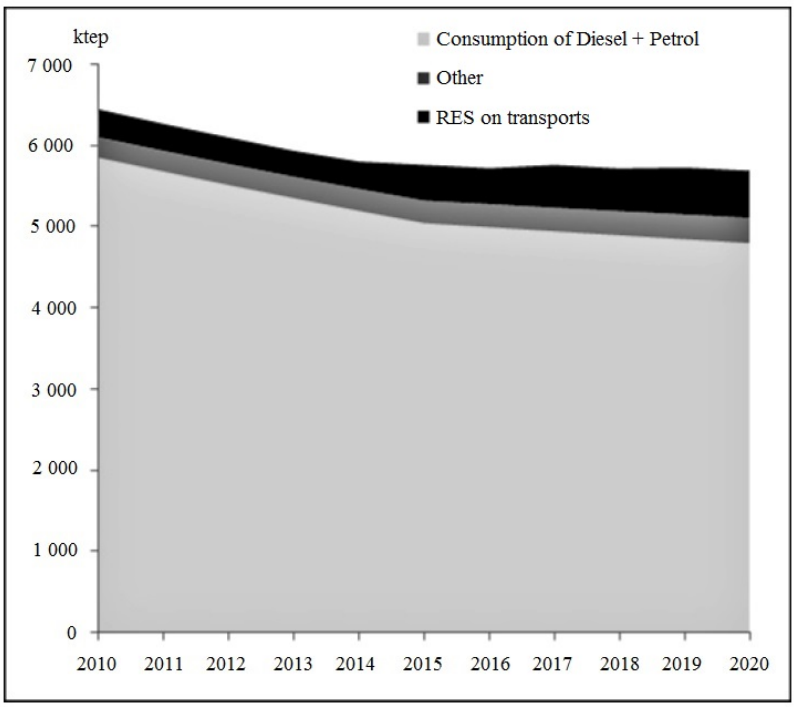


FIGURE 13
Estimated evolution of the contribution of different sources of energy in the Transport sector



3.3.1 Electric Mobility

Considering the predominance of petrol products in the transport sector and the difficulty in finding solutions for energy diversification in this area, Portugal has decided to focus on electric mobility, through the Mobi.E programme, approved by Decree-Law No 39/2010 of 26 April 2010, with the current text provided by Decree-Law No 170/2012 of 1 August 2012. This concept has the potential to be exported to other countries. The programme aims to promote the growing use of electric transport, especially in large urban centres, with the dual objective of promoting a more efficient mode of transport and contributing towards improving air quality, by implementing a national network of infrastructure to charge batteries and diverse initiatives which promote electric mobility within the scope of the Municipal Plans for Electric Mobility which have been approved.

The first phase of implementing the Mobi.E programme, which corresponds to the programme's pilot phase, was characterised by the development of a slow charge network in 25 municipalities and by quick charge solutions on the main roads connecting the municipalities.

However, for diverse reasons, the current model was not sustainable for operators in this market. Consequently, the Mobi.E project model is being redesigned, which will include reformulating the business model, so as to sustain the investments which have already been made in accordance with the evolution of demand and associated economic benefits. One of the solutions could be the relocation of charging stations from the pilot project to areas with higher demand, such as, for example, tourist areas, favouring covered areas and those with surveillance.

This new model for the Mobi.E project will be developed within the scope of a broader and more inclusive strategy of Intelligent Transport.

With regard to the number of electric vehicles in Portugal, it is estimated to grow at an AAGR of 44% between 2011 and 2020, for a total of 33 663 electric vehicles, including light passenger vehicles, goods vehicles, buses and motorcycles, as can be seen in the following figure.

FIGURE 14

Evolution of electric vehicles in Portugal

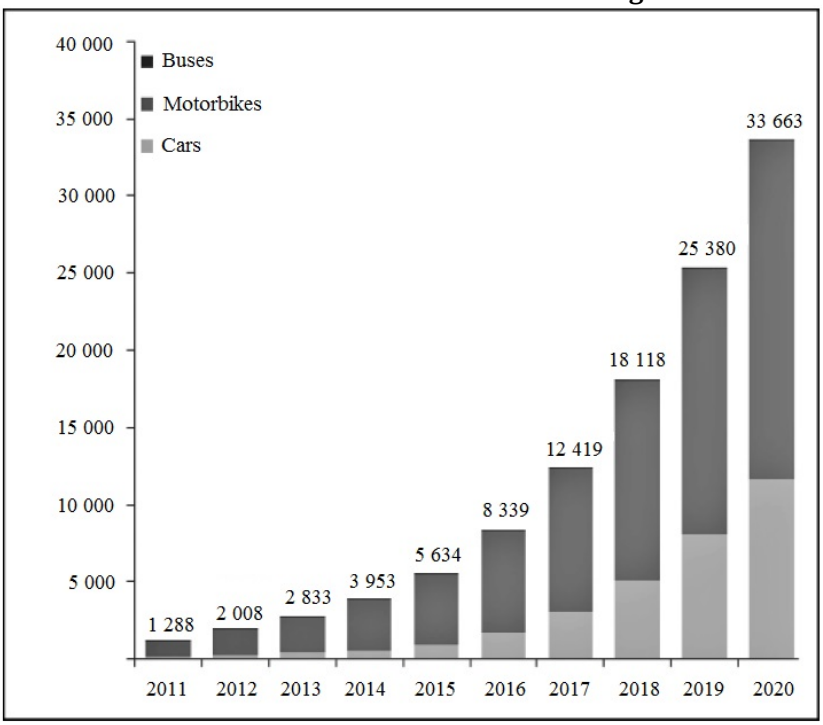
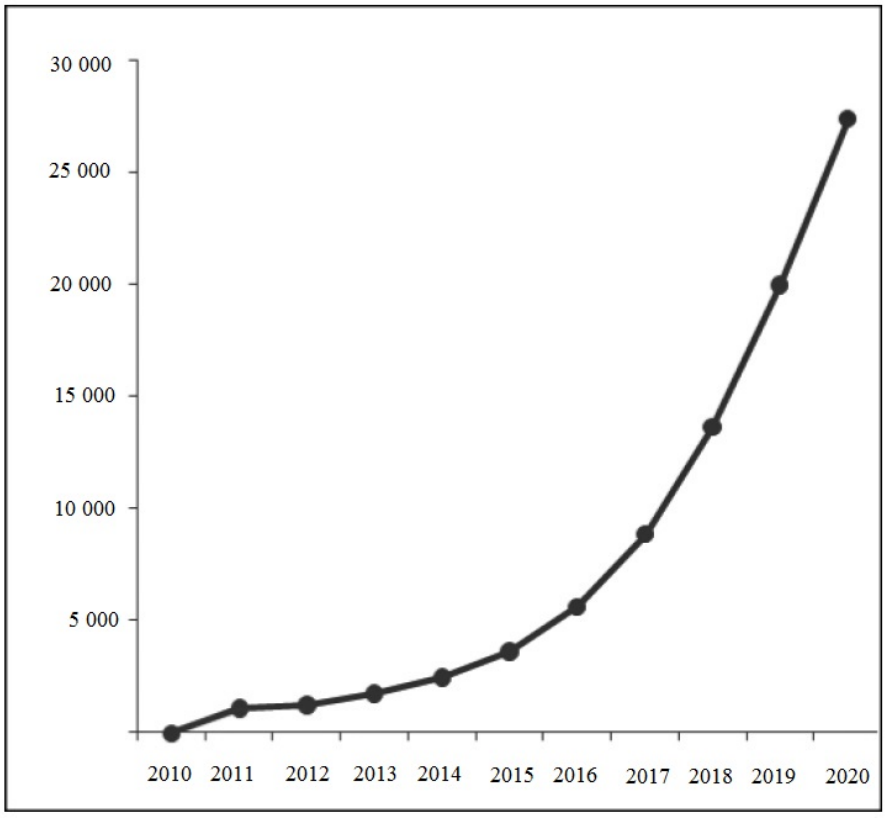


FIGURE 15

Evolution in electricity consumption in road transport (MWh)



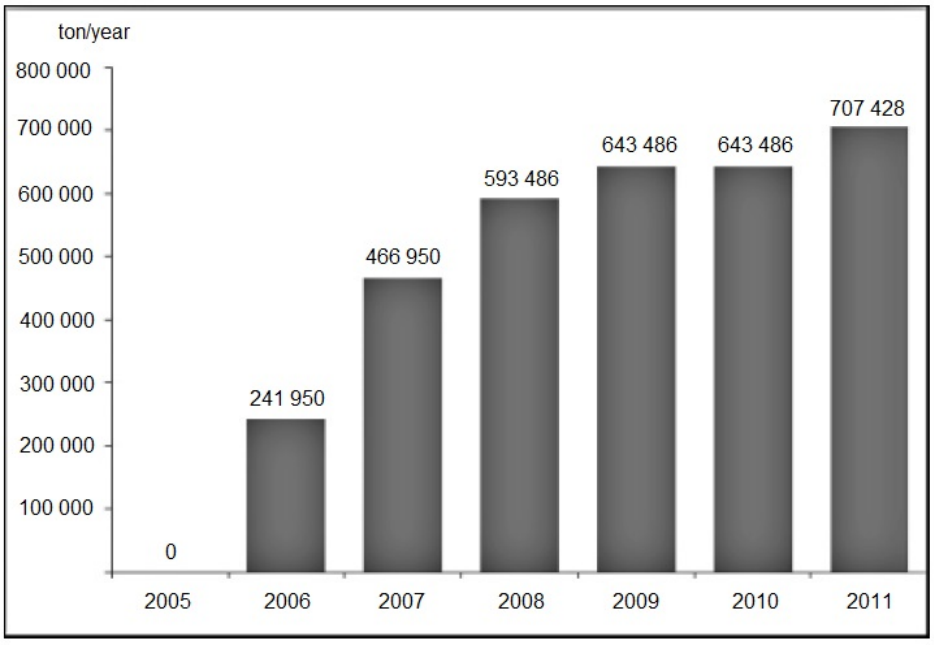
3.3.2 Biofuels

Biofuels are currently the most accessible solution for effectively introducing RES into the Transport sector. This is because they can immediately be used in vehicles which are in circulation, which makes them a suitable choice for complying with the Community goals stipulated for the transport sector. In 2011, the consumption of diesel substitute biofuels (biodiesel) was around 307 ktoe, corresponding to 7%, in volume, of all diesel consumed in the road transport sector.

Considering that in the Transport sector Portugal's fuel consumption profile clearly favours diesel, Portugal is therefore focusing on producing biofuels to substitute diesel. The inauguration of the new refinery unit at Sines, and the consequent increase in diesel production, will open up new prospects for substituting petrol with biofuels.

Effectively, ways of promoting the introduction of petrol substitute biofuels namely bioethanol, are being contemplated. It is estimated that they will be introduced in the market from 2015 onwards on a reasonable scale, which can contribute towards the share of renewable energy in the transport sector.

FIGURE 16
Evolution of biodiesel production capacity in Portugal (ton/year)



Source: DGEG

It is currently compulsory to incorporate 6.75% (v/v) of FAME (fatty acid methyl ester) into road transport diesel. However, even though the maximum quantity of biodiesel incorporation in automotive diesel is limited to the quantity stipulated by norm EN 590, it is possible to sell mixtures with a higher percentage of biofuels, namely B10, with 8% to 10% of FAME, B15, with 13% to 15%, and B20, with 18% to 20%, as long as the respective supply equipment is duly labelled.

TABLE 75

Percentages of incorporation of biofuels

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biofuels replacing diesel	5.0%	5.0%	5.5%	5.5%	7.5%	7.5%	9.0%	9.0%	10.0%	10%
Biofuels replacing petrol	0%	0%	0%	0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

Thus, the obligation to incorporate biodiesel in automotive diesel and the regulations governing the sale of richer blends with a higher biofuel content of up to 20% (v/v) aim to boost the development of the biofuel chain in Portugal and compliance with the goals for introducing this type of fuel into national consumption.

It is important to keep in mind that biofuels used in the EU must comply with sustainability criteria in order to be counted for said incorporation targets (cf. Article 17 of the Renewable Energy Directive). In practice, this means that:

a) Greenhouse gas emissions throughout the production chain must be at least 35% lower than those from fossil fuels.

In 2017 this limit will be raised to 50%;

b) Biofuels produced from raw materials derived from the following sources cannot be considered to be sustainable:

i) From lands rich in biodiversity;

ii) From lands with a high carbon content;

iii) From lands classified as wetlands, except if cultivation and harvesting does not entail draining previously undrained soil.

Therefore, for the purposes of this Plan, all incorporated biodiesel is deemed to comply with the abovementioned sustainability criteria.

3.3.3 Other Renewable Fuels

3.3.3.1 Biomethane

Portugal has potential to use biogas, which in the past was almost exclusively for producing electric energy in plants essentially located near WWTPs, landfills, organic residue recycling centres (CVO), agricultural and cattle farms and agro-food industries. As has already been mentioned, the transformation of biogas into biomethane and its subsequent injection into the natural gas network, after meeting the technical, quality and safety requirements, will make the use of this RES more versatile, extending its use to thermal purposes, in the industrial as well as the domestic and services sectors. It will also make it possible to use biogas to supply vehicles running on natural gas (vehicular NG) in dedicated filling stations.

This solution will have some effects of scale, it being necessary to concentrate effluent treatment or create effluent collection networks, with a view to reducing production and operation costs. Moreover, it is also necessary to be close to the national natural gas system (SNGN) infrastructure. As an alternative, liquefaction solutions could also be used to transport biomethane in a liquid form.

Isolated or small scale solutions can also be contemplated for producing biomethane to directly supply vehicle fleets in filling stations situated near production sites.

3.3.3.2 Hydrogen

As an energy resource, hydrogen has myriad potential uses, ranging from the production of electric energy to direct combustion, including being used for technological solutions implemented in the transport sector, namely fuel cells.

In articulation with the institutions of the national scientific and technological system, namely national laboratories and universities, and the association for promoting the use of hydrogen, a 'Hydrogen Road Map' is currently being prepared, with a view to identifying the potential of this resource and the best solutions for its use.

4. Overall Summary of the NREAP

4.1 Estimated Evolution

Portugal has seen favourable evolution with regard to the target of incorporating RES into final gross energy consumption from 2005 (base year) to the present. In the period between 2005 and 2010, the monitoring carried out revealed that, in 2010, the overall share of RES reached 24.6% of final gross energy consumption, which represents an evolution of 5% over 2005. It must be noted that the value of the overall target remained unchanged between 2009 and 2010, due to the identification of the real value of the consumption of biomass in the domestic sector through the ICESD carried out in 2010 by DGEG in partnership with INE, I.P. The ICESD enabled data on the use of biomass in this sector, which dated back to 1996, to be updated. This updating made it necessary to correct the estimates on biomass reported in the 2010 energy balance by -35%.

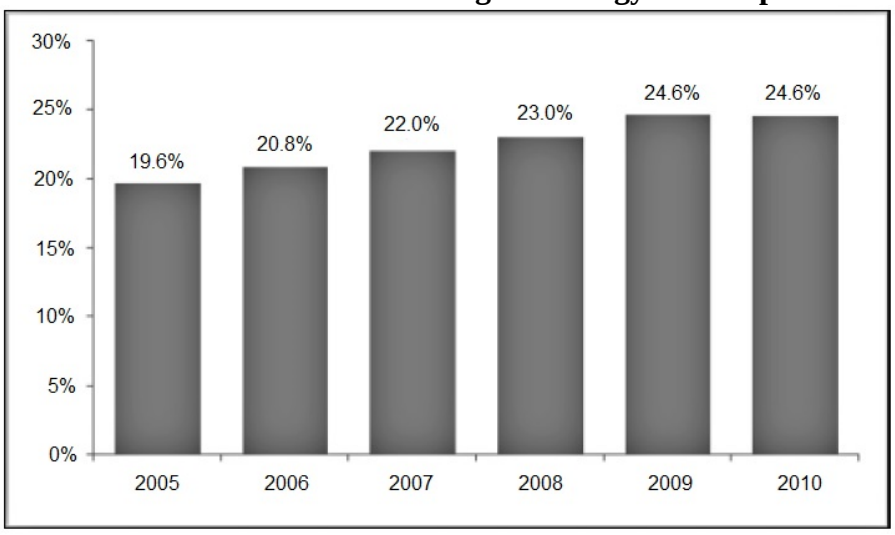
CHART 6

Overall national target for energy share from renewable sources in final gross energy consumption in 2005 and 2020

A)	Energy share from renewable sources in final gross energy consumption in 2005 (S2005) (%)	19.6
B)	Target with regard to energy from renewable sources in final gross energy consumption in 2020 (S2020) (%)	31.0
C)	Total energy consumption adjusted forecast for 2020 (ktoe)	16 623
D)	Amount of energy forecast from renewable sources Corresponding to target for 2020 (B x C) (ktoe)	5 153

FIGURE 17

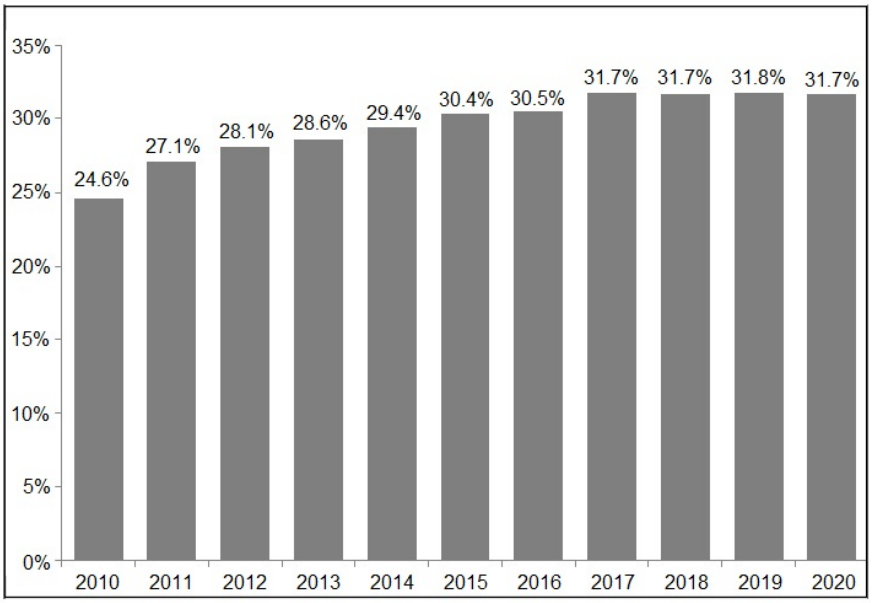
Evolution in overall share of RES in final gross energy consumption in Portugal



In the 2013-2020 period, favourable evolution is expected in terms of achieving the overall target for using RES, with a view to complying with the goal stipulated for 2020, considering the slowdown in demand for energy coupled with a serious and continuous emphasis on promoting renewable energy in diverse sectors. The following figure shows the evolution of the overall target envisaged for 2020 in the Reference Scenario.

FIGURE 18

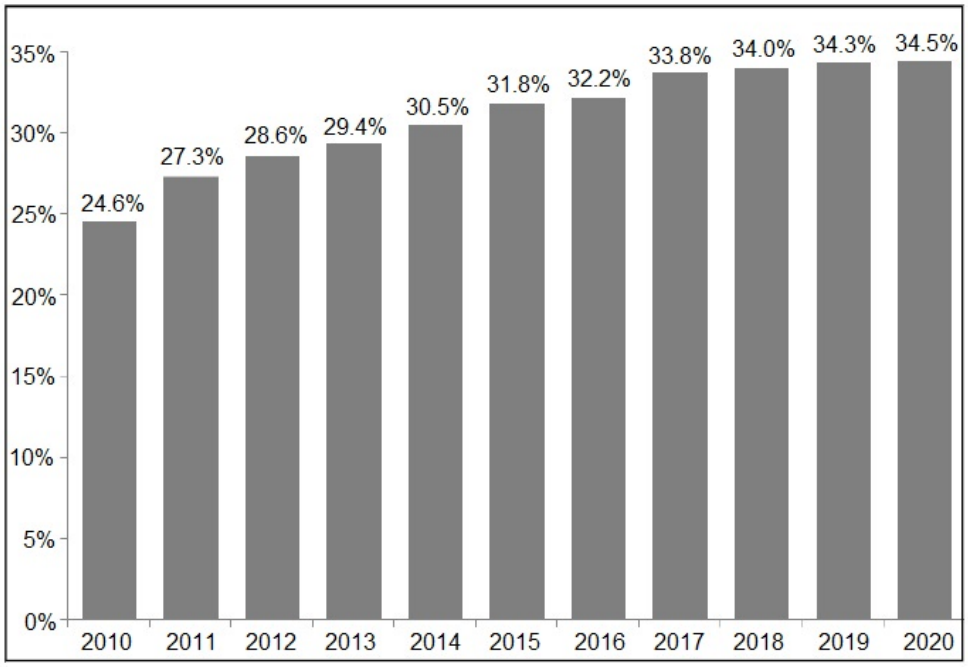
Evolution of estimated energy from renewable sources in final gross energy consumption (Reference scenario)



The Additional Energy Efficiency Scenario, which considers the effects of the NEEAP 2016, shows the following evolution of the overall target of incorporating RES in the final energy consumption envisaged by 2020:

FIGURE 19

Evolution of estimated energy from renewable sources in final gross energy consumption (Additional Energy Efficiency Scenario)



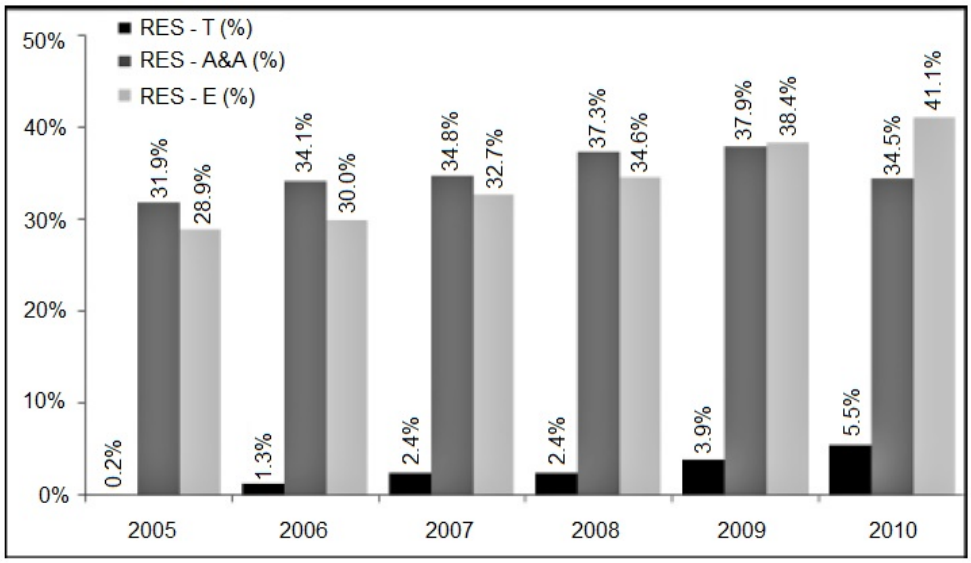
In both scenarios, Portugal complies with the overall RES target before 2020: in the Reference Scenario in 2017 and in the Additional Energy Efficiency Scenario in 2015.

The margin identified as compared to the goal of 31.0% assumed for 2020, which varies between 0.7% and 3.5%, must be viewed as a safety margin for Portugal to ensure compliance with the goal and not as a margin available to be negotiated by means of the cooperation mechanisms envisaged in the Renewable Energy Directive, which contemplates the possibility of statistical transfers of a specific quantity of energy from RES. In effect, the uncertainty regarding the timing of the economic recovery, which will lead to an increase in energy demand, means that it is important for Portugal to have room for manoeuvre to comply with the objectives of the Renewable Energy Directive in time without the need for additional efforts, which would entail extra costs for the economy, companies and families.

4.2 Sectoral Trajectories and Aims

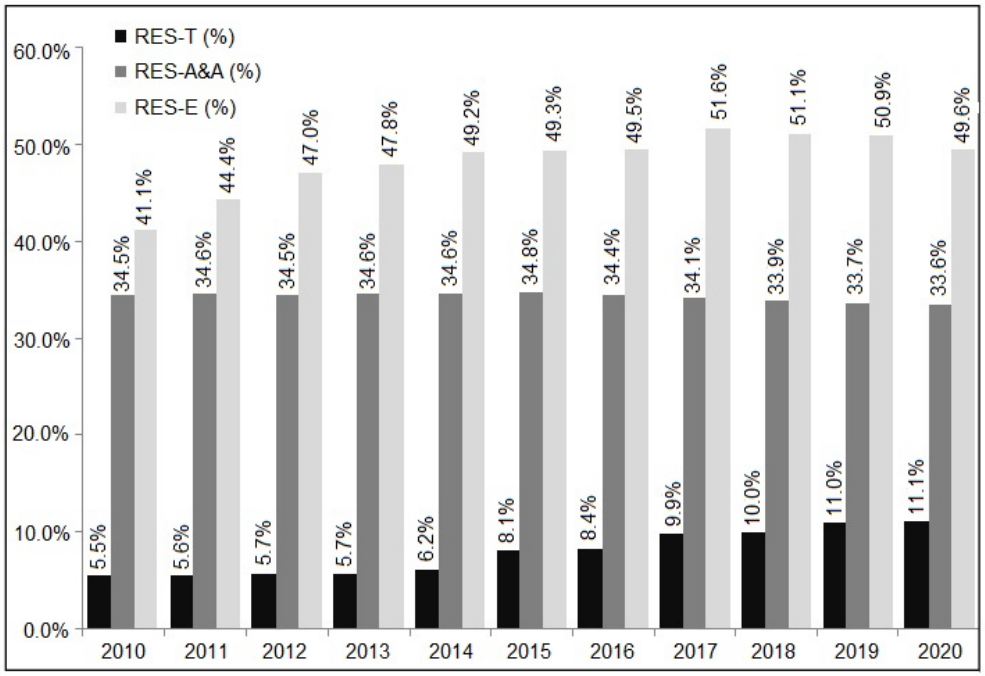
In 2010, Portugal recorded a 5.5% contribution of RES in the Transport sector. In the electricity sector this contribution was 41.1%, while the figure was 34.5% in the heating and cooling sector. It is also important to note the positive evolution of these sectoral trajectories between 2005 and 2010, especially in the Transport sector, which achieved half the goal stipulated for 2020 in just five years.

FIGURE 20
Evolution in sectoral trajectories and objectives in Portugal



The following figure shows the evolution of the contribution of RES in the various sectors contemplated by the Renewable Energy Directive for the 2010-2020 period, in the Reference Scenario:

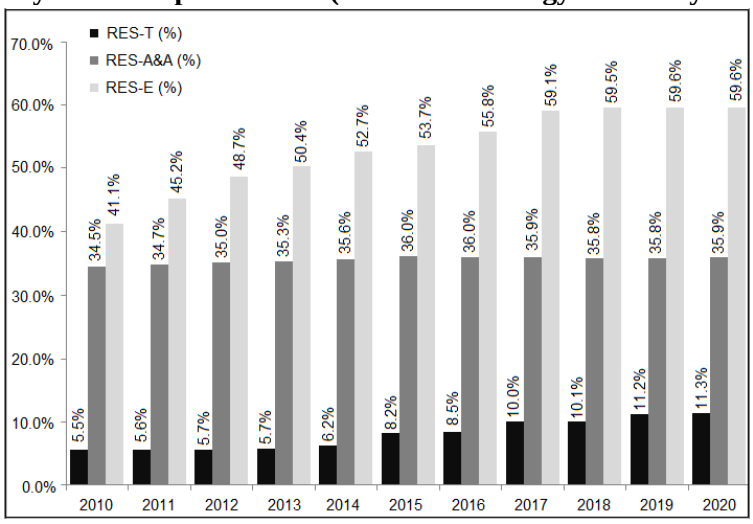
FIGURE 21
Evolution of estimated trajectory of energy from RES in the heating and cooling, electricity and transport sectors (Reference scenario)



In the Additional Energy Efficiency Scenario, the expected evolution for the contribution of RES in the various sectors for the 2010-2020 period is as below:

FIGURE 22

Evolution of estimated trajectory of energy from RES in the heating and cooling, electricity and transport sectors (Additional Energy Efficiency Scenario)



For 2020 it is estimated that the contribution of RES in the heating and cooling sector will be between 33.6% and 35.9%, between 49.6% and 59.6% in the electricity sector and between 11.1% and 11.3% in the transport sector, depending on whether the Reference Scenario or the Additional Energy Efficiency Scenario is considered.

As has been mentioned before with regard to the positive margin expected for the overall RES goal, this is also applicable to the Transport goal. Forecasts indicate that the target of 10.0% RES in the Transport sector can be achieved in 2017 or 2018, depending on whether the Additional Energy Efficiency Scenario or the Reference Scenario is considered, respectively, wherein the margin can vary between 1.1% and 1.3% in 2020.

The figures in the following charts refer to the Additional Energy Efficiency Scenario.

CHART 7

National target for 2020 and estimation of trajectory of energy from renewable sources in the heating and cooling, electricity and transport sectors

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES-H&C (%)	31.9%	34.5%	34.7%	35.0%	35.3%	35.6%	36.0%	36.0%	35.9%	35.8%	35.8%	35.9%
RES-E (%)	28.9%	41.1%	45.2%	48.7%	50.4%	52.7%	53.7%	55.8%	59.1%	59.5%	59.6%	59.6%
RES-T (%)	0.2%	5.5%	5.6%	5.7%	5.7%	6.2%	8.2%	8.5%	10.0%	10.1%	11.2%	11.3%
Overall share of RES (%)	19.6%	24.6%	27.3%	28.6%	29.4%	30.5%	31.8%	32.2%	33.8%	34.0%	34.3%	34.5%
Part from cooperation mechanism (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Surplus to cooperation mechanism (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Indicative trajectory	2005		2011-2012		2013-2014		2015-2016		2017-2018			2020
	S_{2005}		S_{2005}+20%(S_{2020}-S_{2005})		S2005+30% (S_{2020}-S_{2005})		S2005+45% (S_{2020}-S_{2005})		S2005+65% (S_{2020}-S_{2005})			S_{2020}
Minimum trajectory of RES (%)	20.5%		22.6%		23.7%		25.2%		27.3%			31.0%
Minimum trajectory of RES (ktoe)	3847		4 109		4 239		4 435		4 696			5 153

(19) Share of renewable energies in the heating and cooling sector: gross final energy consumption from renewable sources for heating and cooling, as defined in Article 5(1)(b) and (4) of Directive 2009/28/EC, divided by the final gross consumption of energy for heating and cooling. Figure in line (A) in Chart 4a divided by the figure in line (1) in Chart 1.
(20) Share of renewable energies in the electricity sector: gross final consumption of electricity from renewable sources for the electricity sector, as defined in Article 5(1)(a) and (3) of Directive 2009/28/EC, divided by the final gross consumption of electricity. Figure in line (B) in Chart 4a divided by the figure in line (2) in Chart 1.
(21) Share of renewable energies in the transport sector: final energy from renewable sources used in the transport sector (see Article 5(1)(c) and (4) of Directive 2009/28/EC, divided by the consumption in transport of: 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in line 3 of Chart 1. Figure in line (J) in Chart 4b divided by the figure in line (3) in Chart 1.
(22) Share of renewable energies in gross final energy consumption. Figure in line (G) in Chart 4a divided by the figure in line (4) in Chart 1.

CHART 8

Calculation chart for contribution of renewable energies in each sector to final energy consumption (ktoe)

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A) Expected gross final consumption of RES for heating and cooling	2 529	2 241	2 262	2 282	2 286	2 294	2 303	2 326	2 350	2 374	2 398	2 431
B) Expected gross final consumption of electricity from RES	1 319	1 992	2 148	2 290	2 347	2 434	2 487	2 525	2 722	2 751	2 764	2 777
C) Expected gross final consumption of energy from RES in transport	12	342	331	326	318	336	439	443	526	526	579	579
D) Expected total consumption of RES	3 847	4 559	**4 722**	**4 876**	**4 927**	**5 037**	**5 198**	**5 259**	**5 559**	**5 607**	**5 694**	**5 737**
E) Expected transfer of RES to other Member States	0	0	0	0	0	0	0	0	0	0	0	0
F) Expected transfer of RES from other Member States and third-part countries	0	0	0	0	0	0	0	0	0	0	0	0
(G) Expected consumption of RES adjusted to target (D) - (E) + (F)	3 847	4 559	4 722	4 876	4 927	5 037	5 198	5 259	5 559	5 607	5 694	5 737

(23) In accordance with Article 5(1) of Directive 2009/28/EC, gas, electricity and hydrogen from RES can only be considered once. Duplicate accounting is not permitted.

CHART 9

Calculation chart for renewable energies in share of transport (ktoe)

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
C) Expected consumption of RES in transport	12	342	331	326	318	336	439	443	526	526	579	579
H) Expected electricity from RES in road transport	0	0	0.05	0.1	0.1	0.1	0.2	0.3	0.4	0.70	1.0	1.4
I) Expected consumption of biofuels from waste and other sources in transport	0	4	5	5	4	5	6	10	12	12	14	14
(J) Expected contribution of RES to transport for the target of RES-T: (C) + (2,5-1) x (H) + (2 - 1) x (I)	12	346	336	331	323	341	446	454	539	539	594	595

5. Systems to Promote the Use of Energy from RES

As mentioned with regard to the NEEAP 2016, the new macroeconomic context has resulted in new challenges for developing projects in the area of energy supply.

As a consequence, the NREAP 2020 adjusts the mechanisms for promoting the use of RES to available instruments, following the logic of a strict need to comply with goals.

There are various possible mechanisms to support the development of RES in the different areas – Electricity, Heating and Cooling and Transport. The direct mechanisms are the most relevant, especially with regard to tariff balancing (e.g. subsidies for electricity production) and incentives (e.g. investment subsidies, tax incentives and subsidised loans).

Apart from these mechanisms the NREAP 2020 can also be supported by means of financial instruments based on funds which provide finance for projects related to RES, such as the ISP, the PCF and the NSRF (within the scope of the Regional Operational Programmes and COMPETE – Competiveness Factors).

5.1 In the Electricity Sector

Decree-Law No 215-B/2012 of 8 October 2012 stipulated that the activity of producing electricity under a special system could be carried out under one of the following remuneration systems:

a) The general system, in which electricity producers sell the electricity produced on the same terms applicable to production under the ordinary system (in organised markets or by signing bilateral contracts with end users or with electricity retailers). To this end, said decree-law also defined the activity, the way in which licences are to be attributed, and the rights and duties of the market facilitator, who is obliged to acquire the energy produced by electricity production centres under a special system, encompassed by the general remuneration system, which wish to sell the said energy. It is still compulsory to place said energy on the market;

b) The guaranteed remuneration system, in which the electricity is delivered to the Supplier of Last Resort (SLR) against the payment of the remuneration attributed to the electricity producer pursuant to the regulations which will be issued.

For production units licensed before Decree-Law No 215-B/2012 of 8 October 2012 came into effect, the system stipulated in Decree-Law No 312/2001 of 10 December 2001 will tend to continue to be in effect.

Apart from a general system, the legal system applicable to electricity production from renewable resources, by means of mini-production units, approved by Decree-Law No 34/2011 of 8 March 2011, amended by Decree-Law No 25/2013 of 19 February 2013, and the legal system applicable to electricity production from renewable resources, by means of micro-production units, approved by Decree-Law No 363/2007 of 2 November 2007, amended by Law No 67-A/2007 of 31 December 2007, by Decree-Law No 118-A/2010 of 25 October 2010 and by Decree-Law No 25/2013 of 19 February 2013, envisage a subsidised remuneration system based on a predefined reference tariff, which is subject to the application of an annual reduction percentage, which is also fixed beforehand.

The recent change introduced by Decree-Law No 25/2013 of 19 February 2013 to the mini-production legal system, as well as that relating to micro-production, clarified the transitional solutions applicable to micro-production and mini-production in terms of the general remuneration system. It established that, in the case of micro-production, the electricity produced must be acquired for the energy cost of the tariff applicable in 2012, updated annually according to the rate of inflation, and, in the case of mini-production, for the average monthly price of the Iberian Electricity Market Operator, for the Portuguese hub.

Furthermore, Decree-Law No 141/2010 of 31 December 2010, amended by Decree-Law No 39/2013 of 18 March 2013, enshrined a model for issuing guarantees of origin, by which electricity producers or producers of energy for heating or cooling from RES which have an installed capacity of more than 5MW must ask the guarantees of origin issuing entity (EEGO) to issue guarantees of origin for the energy they produce.

The guarantee of origin aims to prove to the end user the share or quantity of energy derived from RES present in the energy mix of a given retailer, and it can be transacted by the respective holder, namely within the European Union, independently from the underlying associated energy, as long as the respective producer does not benefit from a system of support.

If producers benefit from a system of support, the sale of the energy produced to the SLR involves the simultaneous delivery of the respective guarantees of origin, which the SLR can trade in order to balance the extra costs associated with acquiring electric energy derived from RES from electricity producers.

5.2 Support for Cogeneration

Within the scope of systems to support cogeneration based on RES, Decree-Law No 23/2010 of 25 March 2010 established two types of remuneration systems:

a) The general system, accessible to all cogeneration plants without any restrictions on installed capacity, in which the remuneration for the thermal and electric energy produced is done mainly according to market rules, even though a temporary payment of a market participation premium has been envisaged for facilities with an installed capacity equal to or less than 100 MW;

b) The special system, accessible only to cogeneration plants with an installed capacity equal to or less than 100 MW, in which the remuneration of the thermal energy takes place subject to market conditions, but the electric energy is delivered to the network for sale by the SLR, against a temporary reference tariff, defined in Order No 140/2012 of 15 May 2012, amended by Order No 325-A/2012 of 16 October 2012, which is complemented by the payment of efficiency premiums.

5.3 In the Heating and Cooling Sector

The micro-production programme (Decree-Law No 363/2007 of 2 November 2007, with the text provided by Decree-Law No 25/2013 of 19 February 2013), requires the installation of solar heating panels to be able to access the subsidised tariff for electricity production.

Buildings which use renewable energy for climate control or for heating hot water, irrespective of whether they are new buildings or large scale renovations, can benefit in terms of energy category classification within the ECS. This use is compulsory whenever the technical conditions necessary for installation are available, thus encouraging the use of sources of renewable energy for heating purposes in buildings.

With regard to industry and large energy consuming facilities, the SGCIE envisages benefits in terms of energy performance for using renewable energy for heating

purposes, thus constituting an incentive encouraging the use of renewable energy in these facilities.

5.4 In the Transport Sector

The mechanism to support biofuels, established by Decree-Law No 117/2010 of 25 October 2010, functions in the following manner:

A goal is set for the incorporation of biofuels for each year, which is obligatory for the entities providing fuels for consumption (incorporators).
In terms of energy content, the goals are as below:

5.0% for 2011 and 2012;
5.5% for 2013 and 2014;
7.5% for 2015 and 2016;
9.0% for 2017 and 2018;
10.0% for 2019 and 2020.

From 2015 onwards there will also be a specific target of 2.5% of energy content for incorporating diesel substitute biofuels.

So as to prove compliance with the goal, incorporators will have to submit a sufficient number of biofuel incorporation certificates (TdB) to the DGEG every year for cancellation.

One TdB corresponds to 1 toe of biofuels introduced into consumption. Biofuels will have to comply with sustainability criteria in order to be eligible for TdBs.

The raw materials mentioned in Article 21(2) of the Renewable Energy Directive for the purpose of issuing TdBs are entitled to a double subsidy, i.e. 1 toe of biofuel derived from these raw materials are entitled to 2 TdBs.

With regard to Small Dedicated Producers (SDP), Order No 320-E/2011 of 30 December 2011, which regulates Article 90(4) of the CIEC, stipulates the terms by which SDPs can continue to benefit from ISP exemptions. The biofuels they produce must comply with the sustainability criteria but are not entitled to TdBs.

6. Impact

Portugal’s emphasis on renewable energy has yielded positive results, which is evident from the impact on the Portuguese economy in recent years.

The decentralised nature of renewable energy enables a more balanced territorial distribution of investment, contributing towards greater regional and local development.

In terms of employment generated in the sector, it is estimated that compliance with the goals envisaged in this Plan will create approximately 70 000 new jobs directly and indirectly, considering that the RES sector currently already employs about 29 000 people (including the electricity, heating and cooling and transport sectors).

The impact on the balance of savings for energy can signify savings of around 2 657 million euros (Brent = 112 $/barrel; Natural Gas = 11 $/MBtu), which is equivalent to a reduction in imports of energy products of 3 018 million m^3 of natural gas in the electricity sector and 17 million barrels of oil outside the electricity sector (transport, heating and cooling). This overall effort of investing in renewable energy and energy efficiency will make it possible to reduce Portugal's energy dependence from the current 79% to figures closer to 74% in 2020.

As for CO_2 emissions, compliance with the NREAP 2020 will enable an estimated reduction of 28.6 Mton by 2020, which corresponds to a value equivalent to 286 million euros (CO_2 = €10 /ton).

The calculation of reductions of greenhouse gas emissions associated with the NREAP will be evaluated in the future as part of the PNAC 2020.

CHART 10

Calculation chart for renewable energies in share of transport (ktoe)

Measure	Forecast use of renewable energies (ktoe)	Forecast cost (in M€) – indicate timescale	Forecast reduction in GHG (Mton CO_2 eq/year)	Forecast creation of employment
(Overall)	5 737	n. a.	28.6	70 000

7. Monitoring

The goals of the NREAP 2020 must be monitored annually and 2014 is a key year for defining the strategy for the second five year period (2015 -2010). Moreover, 2014 is also a year in which it will already be possible to ascertain the estimated energy consumption curve, at the level of the implementation of the PNBEPH and the SRP (Special Regime Production) portfolio, the impact of the revised NEEAP measures and the impact of the measures and the reformulated goals for transport. This will also be a period of time which is sufficient for identifying additional energy efficiency measures, introducing new processes for attributing RES capacity in the electricity sector and regulating the incorporation of more advanced biofuels

The line of action which will be defined for the future will thus depend on the divergence seen in 2014 from each of the relevant variables (wherein the variables of primary and final energy consumption are particularly relevant for calculating RES incorporation needs).

Thus:

a) Annual control must be carried out until 2014, implementing and reinforcing energy efficiency measures which require low investments;

b) In 2015, depending on the figures obtained in 2014, additional capacity can be considered for electricity production in order to comply with targets.

PART III

List of abbreviations

ADUP – Public Utility Sports Associations
ARCE – Energy Consumption Rationalization Agreement
CFL – Compact Fluorescent Lamps
CIEC – Special Excise Tax Code
CSP – Concentrated Solar Power
CVO – Organic Residue Recycling Centres
CPV - Concentrated Photovoltaics
DCR – Declaration of Regulatory Compliance
DGEG – Directorate General of Energy and Geology
ECO.AP – Public Administration Energy Efficiency Programme
EEGO – Guarantees of Origin Issuing Entity
EGS – Enhanced Geothermal Systems
ERSE – Energy Service Regulatory Authority
EPC – Energy Performance Contract
ESE – Energy Services Companies
ESPAP, I. P. – Public Administration Shared Services Entity, I. P.
ETAR – Waste Water Treatment Plant
EU – European Union
FAI – Innovation Support Fund
FAME – Fatty Acid Methyl Ester
FEE – Energy Efficiency Fund
FPT – Flexible Public Transport
GDA – Degree-Days of Heating
GDP – Gross Domestic Product
H&A – Heating and/or cooling
ICESD - Energy Consumption in Domestic Sector Survey
IMTT, I.P – Mobility and Land Transport Institute, I.P.
INE, I.P. – National Statistics Institute, I.P.
PL – Public Lighting
IPO – Obligatory Periodic Inspection
IPSS - Private Social Solidarity Institution
ISV – Vehicle Tax
IUC – Road Tax
JESSICA – Joint European Support for Sustainable Investment in City Areas
LEAP – Long Range Energy Alternatives Planning System
LED – Light Emitting Diode
NCCP – National Climate Change Programme
NEEAP – National Energy Efficiency Action Plan
NELAP – National Emission License Allocation Plan
NG – Natural Gas
NREAP – National Renewable Energy Action Plan
NSRF – National Strategic Reference Framework

PCF – Portuguese Carbon Fund
PNBEPH – National Programme for Dams with High Hydroelectric Potential

PPEC – Plan to Promote the Efficient Consumption of Electric Energy
PREN – Energy Consumption Rationalisation Plans
RCCTE – Regulations on the Thermal Behaviour Characteristics of Buildings
R&D – Research & Development
R&DT – Research & Technological Development
RES – Renewable Energy Sources
RGCE – Regulations for Managing Energy Consumption
RR – Rolling Resistance
RSECE – Regulations for Climate Control Energy Systems in Buildings
SGCIE – Intensive Energy Consumption Management System
SCE – National Building Energy Certification and Internal Air Quality System
SLR – Supplier of Last Resort
TdB – Biofuel Incorporation Certificates
toe – Ton Oil Equivalent
VAT – Value Added Tax