AGÊNCIA PARA A ENERGIA

Energy Efficiency Policies and Measures in Portugal 2006-2007

Monitoring of Energy Efficiency in EU 27,

Norway and Croatia (ODYSSEE-MURE)

ADENE- Agência para a Energia

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1 Executive Summary

Portugal is one of the countries in the 27-member European Union (EU) with the most ambitious alternative energy goals, having set a target for 45% of its electricity to be produced from alternative sources by 2015.

These objectives will be met by increasing all areas of energy supply, by the promotion of energy efficiency and the wise use of energy, orienting the growth of energy consumption at a level lower than the growth of the country's wealth measured in monetary units by the GDP – Gross Domestic Product.

On the othe hand, the National Energy Efficiency Action Plan comprises a set of programmes and measures aiming at an increase in energy efficiency equivalent to about 10% of the final energy consumption, with a 2015 timeline.. The Plan is also geared towards energy demand side management and complements the PNAC, the National Climate Change Programme and PNALE, the National Allocation Plan for Emission Allowances.

The Portuguese government estimates that implementation of this plan will allow energy savings of approximately 1792 thousand tonnes of oil equivalents (toe) in 2015, which corresponds to savings of 9.8% for the reference period defined in the EU Energy Services Directive. Collectively, the measures applied to all these sectors will lead to electricity savings of 4,777 GWh in 2015, corresponding to a 7% reduction in national electricity consumption.

This report aims to present an analysis of the main energy efficiency trends in Portugal, covering the national macroeconomic context as well as each activity sector in particular, referring the changes occurred in the country within the period between 2006 and 2007, based on the national collected data and on the "bottom up" energy efficiency indicators, taken from ODYSSEE database.

2 The Background to Energy Efficiency

2.1 Overall economic context

Economic activity in Portugal has gradually improved since late 2005. In 2007 real GDP rose by 1.9%, i.e. 0.5 percentage points (p.p.) more than in the previous year. This acceleration originated in a greater contribution from domestic demand, chiefly due to a rebound in investment in 2007.

The following figure presents the evolution of Gross Value Added, at 2000 prices, over the period from 1990 to 2007 in Portugal.

Figure 1 - Annual growth rate of GDP [Source: INE - Statistics Portugal, National Accounts]

Despite the acceleration in GDP, growth in 2007 remained below the average of the period started in 1995 (when the current national accounts base 2000 series started), amounting to 2.3%. In the period under consideration the pace of economic growth was strong until 2000 (4.1% annual growth average). Thereafter, it has slowed down sharply, and output in annual average terms grew by only 1.1% from 2001 to 2007. These two stages of distinct performances of the Portuguese economy in the period under consideration are also captured by developments in the economy's investment rate, computed by the GFCF/GDP ratio.

This rate, of 22.5% in 1995, has risen gradually, reaching a 27.1% peak in 2000, subsequently declining, to stand at 21.8% in 2007. Also on the first stage mentioned, the Portuguese economy's external borrowing requirements grew on a gradual basis.

These, which had amounted to only 0.4% of GDP in 1995, stood at 9.0% of GDP in 2000. From 2000 to 2003 – the only year that saw a decline in output – external borrowing requirements have decreased, reaching 4.1% of GDP. Since then, they have resumed high levels, although in 2007 this ratio recorded a 0.6 p.p. improvement, to stand at 8.7% of GDP.

This recovery in 2007 was associated with the performance of the goods and service balance, which improved from -8.2 in 2006 to -7.4% of GDP in 2007. This partly reflects the impact of improved terms of trade in 2007.

As already mentioned, the acceleration in output in 2007 was backed by a greater buoyancy of domestic demand, which more than offset the lower contribution from net external demand to GDP growth.

The greater contribution from domestic demand has been chiefly associated with a rebound in investment. From the production approach (gross value added (GVA)), the acceleration observed has been chiefly supported by industries corresponding to manufacturing, other services and construction. By contrast, GVA of agriculture, forestry, hunting and fishing, electricity, gas and water supply, and real estate, renting and business activities have recorded a negative change in 2007.

Throughout the period under review, service activities have been growing in volume, on average, above growth in the rest of the economy. This, jointly with a change in relative prices also generally favourable to service activities – which are by nature less subject to foreign competition – has contributed to relatively higher nominal changes in the respective GVA. Hence, since 1995 the composition of the economy's total GVA has changed considerably (see chart below), evident in a higher relative weight of services. By contrast, the weights of industry and agriculture have declined considerably. [SOURCE: INE 2007, STATISTIC YEARBOOK OF PORTUGAL 2007].

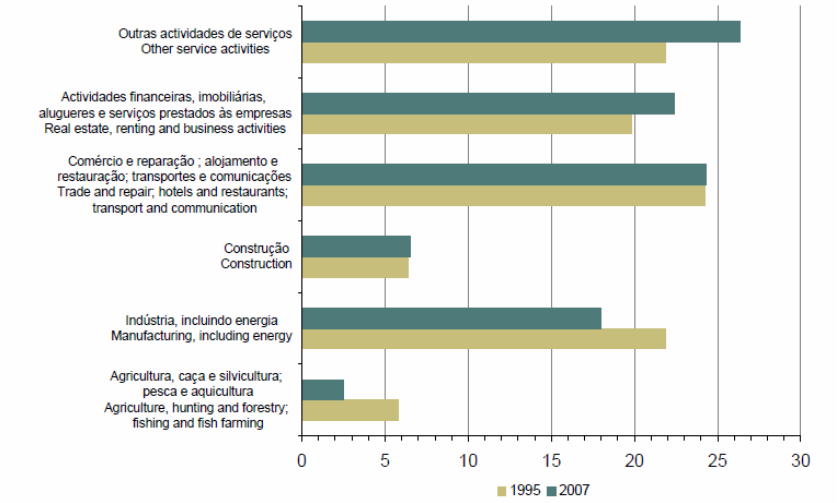


Figure 2 - Percentage composition of GVA

2.2 Energy consumption trends

Energy consumption in Portugal has been growing strongly in the past few years. As far as electrical energy is concerned, in the last decade annual average per capita consumption rose by about 1.5 thousand kWh, translating into an overall increase in consumption by approximately 16 billion kWh (+49.7%). This had a contribution from an increase in the number of consumers by over 20% in the last decade, as a result of a rise in the number of enterprises in Portugal (corporate customers), a surge in residential construction (domestic customers) and an increase in the number of households.

Although the greater consumption of electricity was the responsibility of the industrial sector (around 38%), household consumption accounted for an important share of total electricity consumption (approximately 28%), concentrating 84.2% of total consumers.

In Portugal the production of electrical energy in cogeneration plants started in 2004. However, its weight in total production has remained virtually unchanged since then.

Analysing the main products produced, according to the Classification of Products by Activity (CPA), the most relevant product in 2006 was “diesel and marine diesel”, surpassing “electricity produced”, which in historical terms occupied the country’s top position. Diesel sales grew by 14.3% from the previous year, mostly as a result of the price effect. This also had the contribution from the upsurge in international crude oil prices, since volume production only increased by 3.5% from 2005.

In 2006 there was a considerable increase in the production of electricity of hydraulic origin (almost doubling from 2005), to the detriment of thermal energy. Hence, there was a decrease in electricity prices, given that production costs associated with electricity of hydraulic origin are lower than those of thermal energy, which is quite dependent on fuel imports (charcoal and gas).

There was also a noticeable hegemony of a small number of products in such a way that the five products with the highest growth rates accounted for 60% of the overall change between 2005 and 2006.

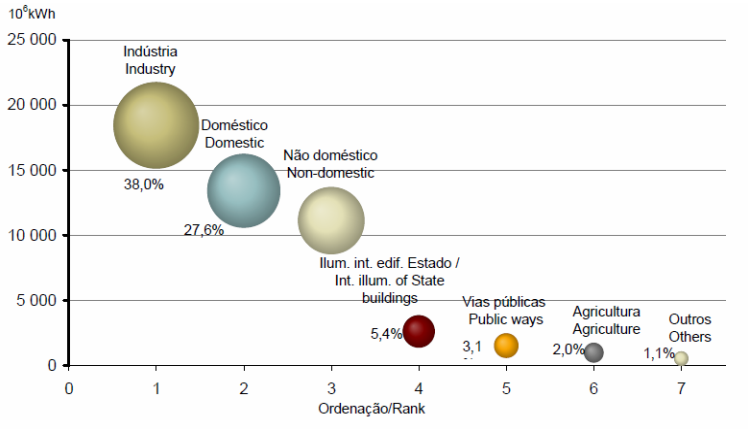


Figure 3 - Consumption of electric energy by consumption type, 2006 [Source: INE – Economic Activity 2007]

Car fuel consumption per inhabitant grew by 1.7% in annual average terms in the last decade, reaching a peak in 2004 (with around 0.71 tep/inhabitant), subsequently decreasing at an annual average rate of -5.0%. Overall, 6.4 million tonnes of car fuel were consumed in 2006, with diesel accounting for the highest share, i.e. around 74.1% of the total.

The analysis of developments in the last decade leads to the conclusion that car fuel consumption (measured through sales by distribution companies) grew by around 5.3% in average terms, chiefly due to a rise in the consumption of unleaded petrol (95 octane). The latter grew by around 12.8% in average terms in that period and saw its weight in total car fuel consumption double (from 10.2% in 1996 to 21.8% in 2006).

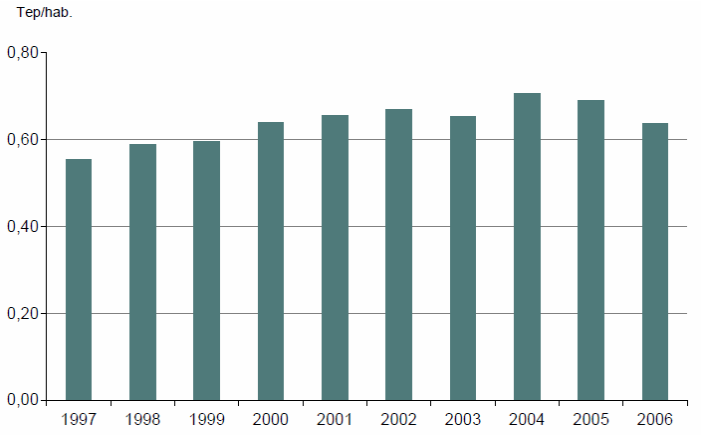


Figure 4 - Consumption of car fuel per inhabitant [Source: INE - Statistics Portugal, National Accounts]

Alternative fuels such as gas have not been a fully fledged option, given that their overall consumption has been declining in the past 10 years by around 2.7%. Moreover, LPG consumption (auto gas) has not been fostered and therefore, since 1999 (when this fuel appears for the first

time) overall consumption figures have remained virtually unchanged, with the 2006 figure even standing slightly below overall consumption in 1999.

2.3 The policy background to energy efficiency

The National Action Plan for Energy Efficiency – Portugal Efficiency 2015 (PNAEE), also designated "Portugal Efficiency 2015", approved by the Council of Ministers Resolution no. 80/2008, 16th of May, comprises a vast series of energy efficiency programmes and measures, with a 2015 timeline, fundamental for Portugal to achieve and surpass the objectives set within the scope of the European Directive no. 2006/32/CE of the European Parliament and Council, of 5 April 2006.

The PNAEE, approved by the Council of Ministers Resolution no. 104/2006, of 23 August, and the National Energy Strategy, approved by the Council of Ministers Resolution no. 169/2005, of 24 October, already included a vast set of energy efficiency measures. The present plan brings greater ambition and cohesiveness to energy efficiency policies, including all sectors and grouping the various approved measures and an extensive series of new measures in 12 specific programmes.

The main objective is to establish implementation of energy efficiency measures leading to a 10% reduction in final energy consumption as a target to achieve by 2015, within the terms foreseen in the aforementioned Directive, regarding efficiency in final use of energy and energy services.

The PNAEE encompasses four specific areas, for which guidelines of an essentially technological nature will be issued: Transports, Residential and Services, Industry and State. Additionally, three transversal action areas are also defined - Behaviours, Taxes and Incentives and Financing, which were object of complementary analysis and guidelines.

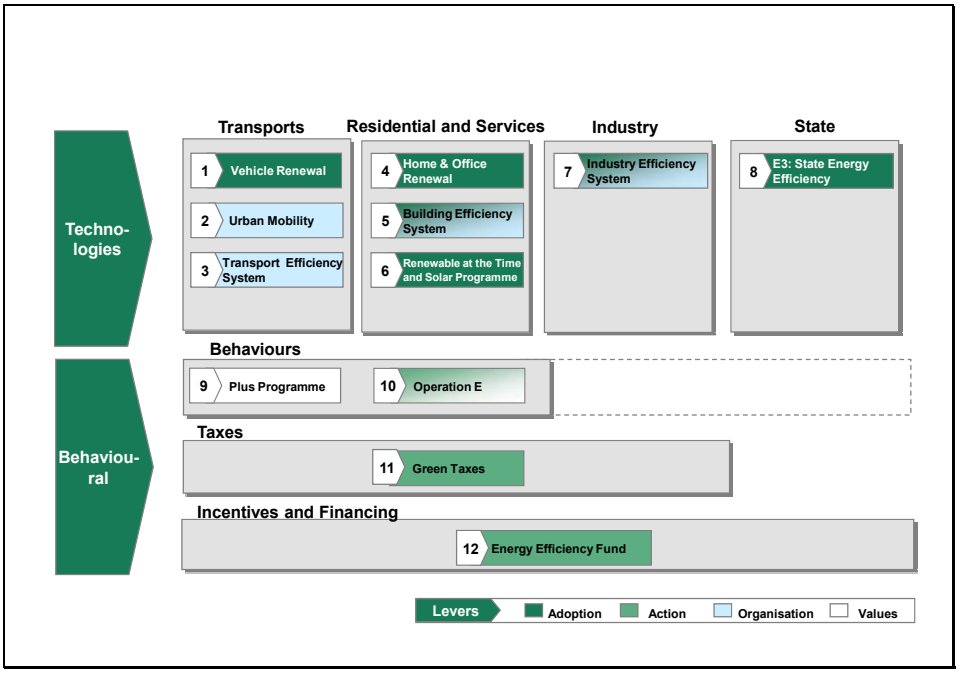


Figure 5 – 12 Portugal Efficiency 2015 Programmes [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

Each of the aforementioned areas includes a series of programmes, which integrate a vast range of energy efficiency measures, aimed at reducing energy demands.

The Transports area includes three programmes aimed at improving energy efficiency:

- Vehicle Renewal Programme, including various measures aimed at improving energy efficiency in vehicles, namely equipment renewal and use of more efficient products.
- Urban Mobility Programme, which identifies measures related with public transport modal and commuting needs in large urban and corporate centres.
- Energy Efficiency System in Transports, which aims to quantify the impact of the concepts of logistics platforms and motorways of the sea on efficient use.

The Residential and Service area includes three large energy efficiency programmes:

- Home Renewal Programme, which defines various energy efficiency measures involving lighting, electrical appliances, consumer electronics and area rehabilitation.
- Energy Efficiency System in Buildings, which groups measures resulting from the process of energy certification in buildings, namely insulation, improvement of glass surfaces and energy systems.

- Renewable at the Time Programme, oriented towards increased penetration of own-production energies in the residential and service sectors.

The Industry area is covered by a programme designated Energy Efficiency System in the Industry, which includes replacement of the Energy Consumption Management Regulations (Decree Law no. 58/82) with new regulations, the Intensive Energy Consumption Management System (SGCIE). Some transversal measures aimed at the industrial sector should be highlighted, aimed at four technological groups: electric motors, heat and cold generation, lighting and other industrial process efficiency measures.

The State area is grouped in a programme designated Energy Efficiency in the State, which includes a series of measures aimed at State buildings and transport fleets, Street Lighting and centralised energy negotiation by the central and local administration.

The Behaviours area includes programmes aimed at promoting energy-efficient consumer habits and attitudes, such as efficient product recommendation, through awareness and communication campaigns.

The Taxes area includes a series of measures aimed at promoting energy efficiency through tax benefits, such as creation of fast depreciation regimes for efficient equipment and establishment of links between the IRS benefits regime and the Energy Certification system for buildings, as well as renewable energies.

The Incentives and Financing area includes a series of innovative programmes, such as creation of the Energy Efficiency Fund, incentives for creation of Energy Service Companies (ESCO) and incentives for urban rehabilitation and electrical appliance acquisition and renewal.

Implementation of this plan allows energy savings of approximately 1,792 thousand tonnes of oil equivalents (toe), in 2015, which corresponds to savings of 9.8% for the reference period defined in the Directive.

The savings achieved exceed the target defined by the European Union by approximately 20%, through efficiency contributions given by the various activity sectors, of which the State leads, with generated savings of approximately 12%.

The energy efficiency levels expected in 2015 will be mostly due to annual savings in Transports, of 729 thousand toe, followed by the transforming Industry, of 418 thousand toe, and the Residential and Service areas, contributing with 330 toe and 150 thousand toe, respectively. The State sector will contribute with annual savings of 48 thousand toe; the “Other sectors” item, including non-transforming industries, will contribute with 119 thousand toe.

Collectively, the measures applied to all these sectors will lead to electricity savings of 4,777 GWh in 2015, corresponding to a 7% reduction in national electricity consumption.

Implementation of the energy efficiency programmes defined will result in final energy consumption rationalisation, with a consequent average annual reduction in energy growth rates of 1.1%, for 2008-2015 (relatively to average consumption for the reference period defined in the Directive).

In terms of energy intensity, implementation of the present plan will allow Portugal to strengthen its convergence with the current European energy intensity average, calculated since 2006 and currently set at approximately 120 toe/million Euros of the Gross Domestic Product (GDP). This efficiency increase objective will result in a reduction equivalent to 11 toe/million Euros of the GDP, an achievable objective for both economic growth scenarios (high and low scenario). [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

3 Overall Assessment of Energy Efficiency Trends

In the last few years and for the first time since the beginning of the '90s, a decrease in final energy consumption was observed. This reduction was particularly noticeable in 2006, with a 1% annual variation rate relatively to the previous year. In 2007, final energy consumption reached similar levels to the previous year.

Since the beginning of the '90s, final energy consumption registered an average annual increase of 3.2%, approximately 0.7% above the average increase in Gross Domestic Product1 for the period.

Since 1990, two energy growth profiles have been observed, a very steep growth profile, observed especially during the second half of the '90s, and the current profile, with lower variation rates, particularly evident since 2001.

Annual growth in energy consumption since 1990 has been consistently higher than annual GDP growth, with only two exceptions, 1994 –1995 and, more recently, after 2005.

In terms of energy consumption distribution by sectors, it is observed that the Industry, Transports and the Residential and Service sectors consume equivalent amounts of energy.

The Service and Transport sectors pressured energy consumption towards an increase, with very significant annual growth rates during the '90s, consistently above 5%, especially for the Service sector, for which two-digit annual growth rates (10.8%) were recorded in the second half of the decade.

In the current decade, it is observed that the Service sector continues to present steep growth, with annual rates increasing to 6.8%, in 2005. A slowdown is being observed for the Transport sector, with annual growth rates slightly below 1% (0.7% annual average).

The Domestic and Industrial sectors, with lower average rates, contribute to a reduction in overall average values.

A very significant growth rate, of 2.8%, was registered for the Residential or Domestic sector, in the second half of the '90s, corresponding to nearly three times the value observed in the first half of the decade.

In the current decade, a reduction in growth rate is observed for the Industrial sector, opposing average values observed in the end of the '90s, where annual growth rates of over 4% were reached. [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

1 GDP calculated considering constant prices in 2000

3.1 Overall trends in energy intensity

An overall assessment of a country energy efficiency performance can be based on indicators such as the primary and final energy intensities (i.e. energy consumption per unit of gross domestic product (GDP) at the overall level of the economy).

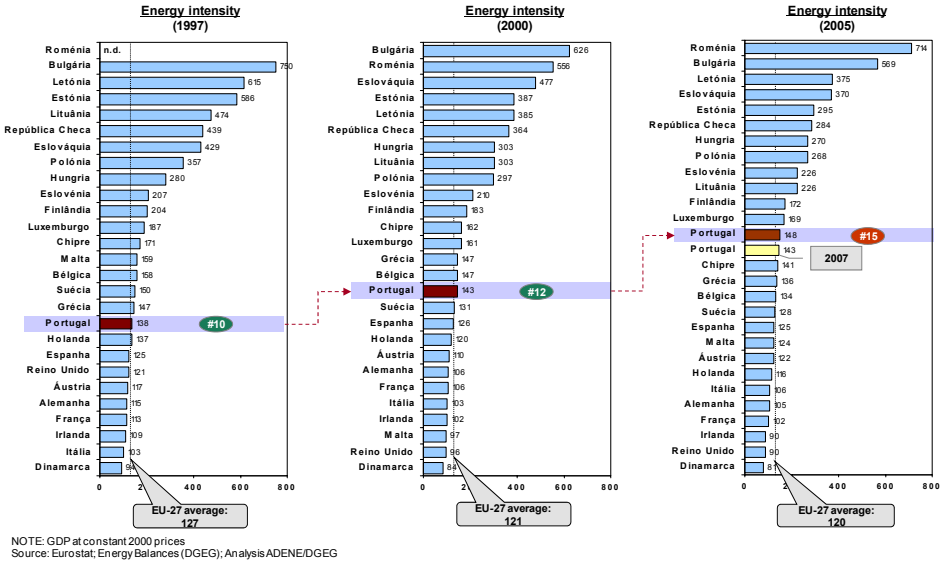
Primary energy intensity is an indicator which relates the total energy consumption to GDP. It measures how much energy is required to generate one unit of GDP (ratio between primary energy consumption and GDP).

Final intensity is extremely useful for the analysis of the end use of energy, it measures the final energy required to generate one unit of GDP (ratio between final energy consumption and GDP).

However, their variations over time reflect not only the energy efficiency improvements but also the impact of other factors, which can either enhance or hamper energy progress such as, structural changes in industrial sector, increasing comfort levels in residential sector, economic and social changes not captured in the GDP structure, etc. Therefore energy intensities should not be faced as indicators of energy efficiency from a technical point of view but rather as indicators of "energy productivity".

Energy intensity in Portugal in 1997 was approximately 138 toe per million Euros of the GDP, i.e., in order to generate 1 million Euros of the GDP it was necessary to consume an excess 11 tonnes of oil equivalents relatively to the average energy consumed by our European counterparts.

Intensity increased until 2005, to 148 units; this indicator improved substantially in Europe during the same period, decreasing from an already optimised 127 to 120 toe/million GDP and more than doubling the existing difference.



NOTE: GDP at constant 2000 prices
Source: Eurostat; Energy Balances (DGEG); Analysis ADENE/DGEG

Figure 6 – Position of Portugal within the European context [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

In the last five years, Portugal managed to significantly decelerate energy consumption, having reversed the relationship between economic and energy growth in the last two years.

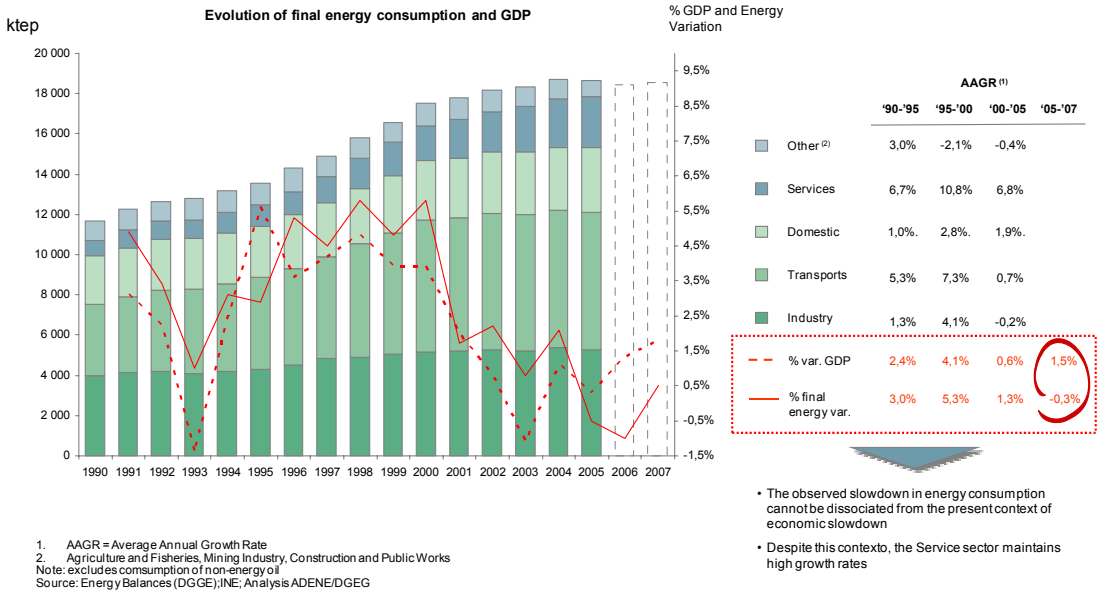


Figure 7 – Relationship between economic and energy growth [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

The first reductions observed were registered in 2006-07, leading to an apparent convergence with European values.

This trend will need to be consolidated and accelerated within the next years, in order to reduce and eliminate the existing difference, which ultimately reflects lower productivity and competitiveness.

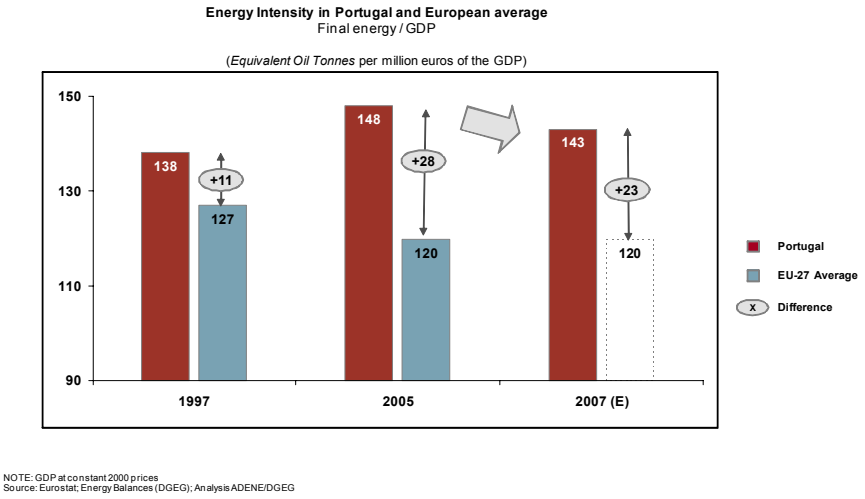


Figure 8 – Energy Intensity in Portugal and European average [Source: PNAEE – Portugal Energy Efficiency Plan 2015]

3.2 Industry

For each industrial branch, the indices are based on unit consumption expressed in terms of energy used per unit of physical output (tons produced for steel, cement, glass and paper and production index for the other branches). Indices capture the energy efficiency development better than traditional energy intensities (per unit of value added). For some branches the trends shown include also some non-technical changes, especially in the chemical industry the shift to light chemicals, due to the fact that this sector is not sufficiently desegregated.

In this case the evaluation is carried out at the level of 10 branches:

- 4 main branches: chemicals, food, textile & leather and equipment goods;
- 3 energy intensive branches: steel, cement and pulp & paper
- 3 residual branches: other primary metals (i.e. primary metals minus steel), other non-metallic minerals (i.e. nonmetallic mineral minus cement) and other pulp, paper and printing (i.e. mainly printing).

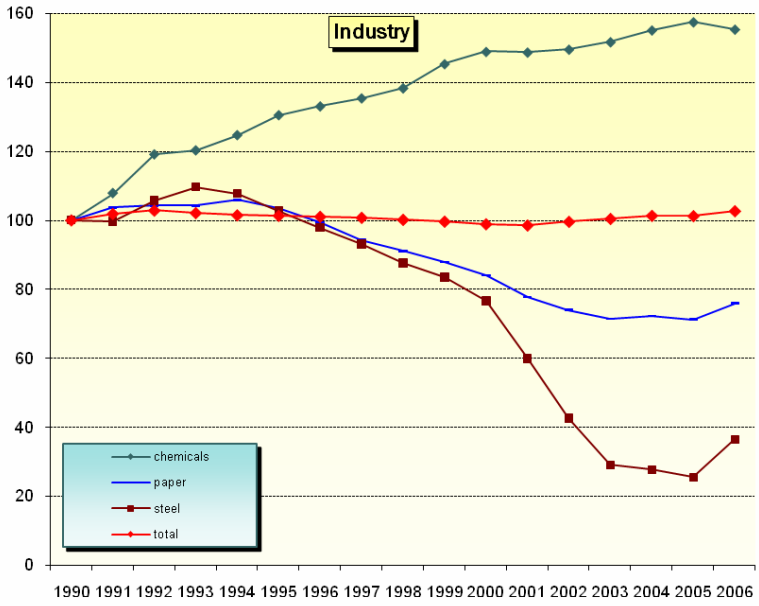


Figure 9 - Energy efficiency index for industry [Source: ODYSSEE]

Energy efficiency in the industrial sector has slightly increased about 3 %, over the period 1990-2005, getting further away from the EU average (-10%). The decrease in efficiency for the whole sector, is mainly due to the chemical branch. Paper and pulp industry show a completely different trend, contributing to a significant improvement in energy efficiency, with a progress in average of about 44% from 1990 to 2006.

3.3 Households

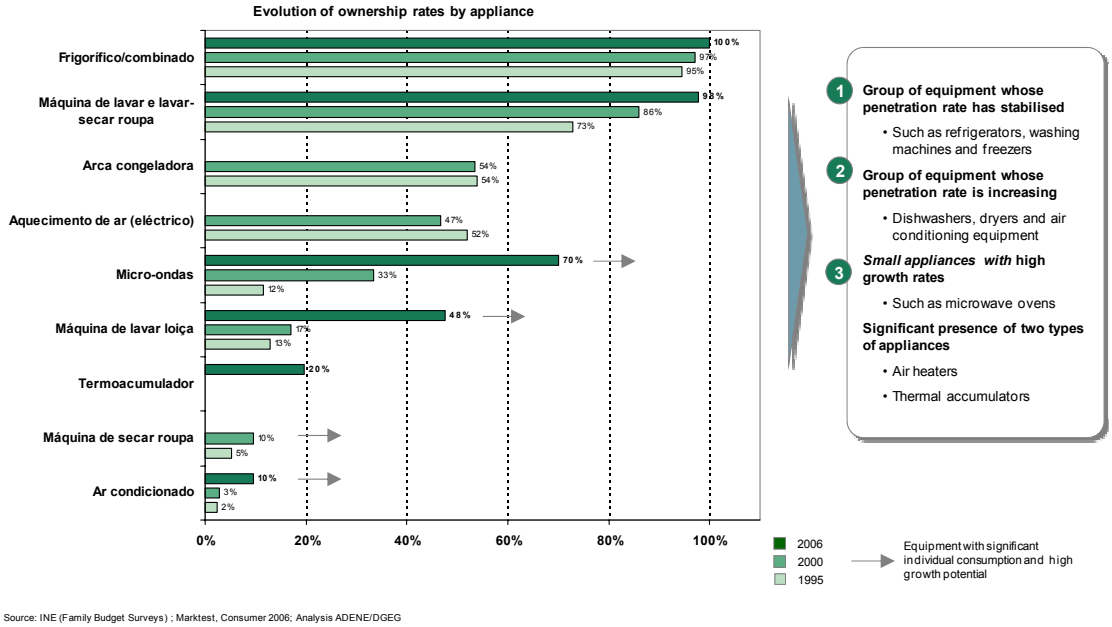
In the household sector, the energy efficiency index aggregates the trends in the different end-uses on the basis of their weight in the total consumption. For space heating, energy efficiency trends are calculated from the change in unit consumption per m^2 at normal climate, and for large electrical appliances from the change in specific electricity consumption, in kWh/year/appliance. For water heating and cooking, energy efficiency trends are captured by the change in unit consumption per dwelling.

For households, the evaluation is carried out at the level of 3 end-uses (heating, water heating, cooking) and 5 large appliances (refrigerators, freezers, washing machines, dishwashers and TVs).

For each end-use, the following indicators are considered to measure efficiency progress:

- Heating: unit consumption per m^2 at normal climate (toe/m^2)
- Water heating: unit consumption per dwelling with water heating
- Cooking: unit consumption per dwelling
- Large electrical appliances: specific electricity consumption per appliance (kWh/year)

The existing electrical appliances and corresponding ownership rates allow us to conclude that three large equipment groups exist.



Source: INE (Family Budget Surveys) ; Marktest, Consumer 2006; Analysis ADENE/DGEG

Figure 10 - Existing electrical appliances and corresponding ownership rates [Source: PNAEE 2015]

Over the period from1990 to 2006 the overall energy efficiency increased only 1%. This improvement is due to the introduction of natural gas, the use of LPG for water and space heating, and also to an improvement in national building construction, namely thermal insulation, use of double gazing and natural lightening.

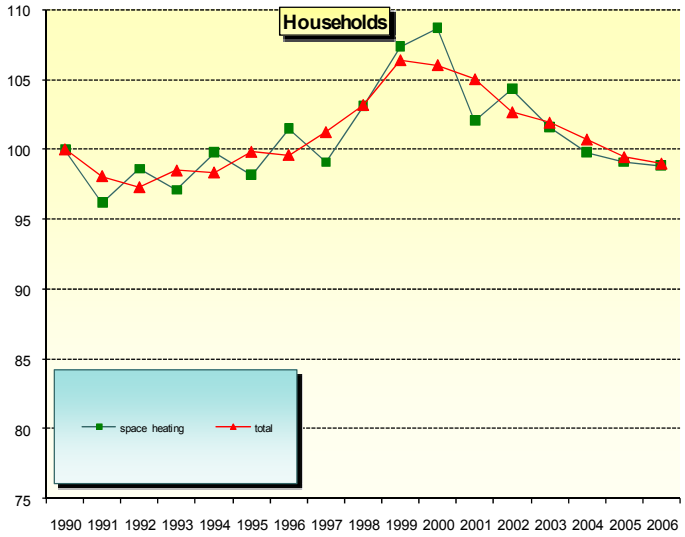
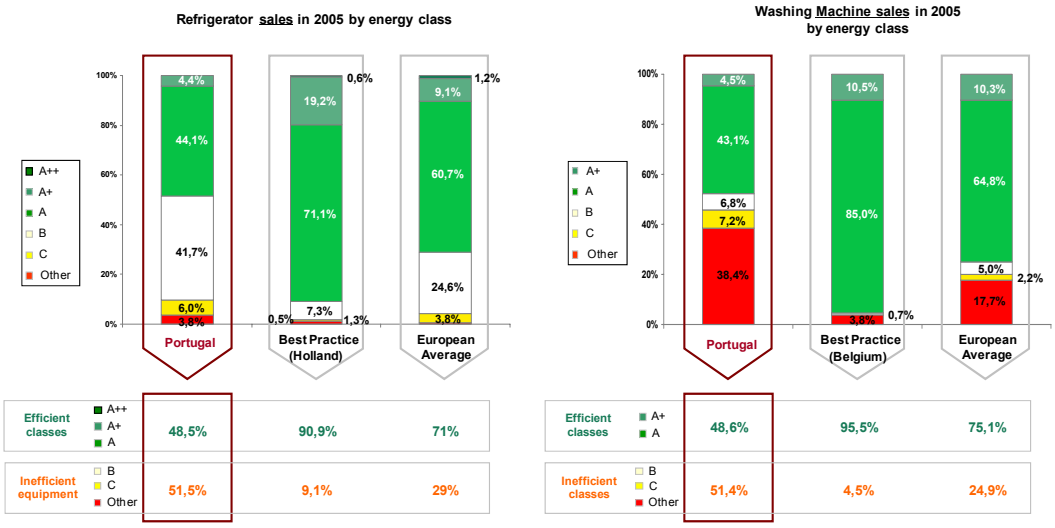


Figure 11 - Energy efficiency index for household [Source: ODYSSEE]

A large potential exists for transfer of electrical appliance sales to more efficient classes both for refrigerators and washing machines.



Source: Electricity Consumption and Efficiency Trends in the Enlarged European Union - Status report 2006, Institute for Environment and Sustainability; analysis ADENE/DGEG

Figure 22 - Potential for transfer of electrical appliance sales to more efficient energy classes [Source: PNAEE 2015]

3.4 Transport:

In the transport sector, the overall energy efficiency index aggregates the trends for each transport mode in a single indicator for the whole sector. For cars, the energy efficiency is measured by the specific consumption, expressed in liter/100km. For the transport of goods (trucks and light vehicles), the unit consumption per ton-km is used, as the main activity is to move goods. For other modes of transport various indicators of unit consumption are used, taking for each mode the most relevant indicator given the statistics available:

- toe/passenger-km for air transport, goe/pass-km for passenger rail, goe/t-km for transport of goods by rail and
- water, toe per vehicle for motorcycles and buses

The evaluation is carried out at the level of 8 modes or vehicle types: cars, trucks, light vehicles, motorcycles, buses, domestic air transport, rail, and water transport. For each mode, the energy efficiency indicators considered are the following:

- cars: specific consumption in litres/km
- trucks & light vehicles : unit consumption per ton-km
- air transport : unit consumption per passenger
- rail ,water : unit consumption/pkm or tkm motorcycles, buses: toe/vehicle

The transports area is responsible for over one third of final energy consumption. In 2005, over 6.8 million toe were consumed in passenger and goods transport activities, with an annual average growth of 4.5% since 1990.

Energy consumption growth in this area reached its maximum in the ‘90s, with an average annual growth of over 5%, in the first half of the decade, and over 7%, in the second half. The average annual growth rate has been 0.7% since the beginning of the current decade.

The most used means of transportation was doubtlessly road transport, with an almost 90% share and high growth rates in the last 15 years, in direct correlation with the steep growth of the vehicle fleet registered in this period.

Another sub-sector with steep consumption increases is air transport, with average annual growth rates of over 6% in the second half of the ‘90s.

Maritime and railway sub-sectors registered decreases or light increases in energy consumption, with very few exceptions. It is worth highlighting that a consistent decrease in annual consumption

has been observed for Railways during the last ten years, especially within the last 5 years, with an annual reduction of 3.5%.

The only exception is maritime transport, for which a growth of over 10% has been observed since the beginning of the current decade.

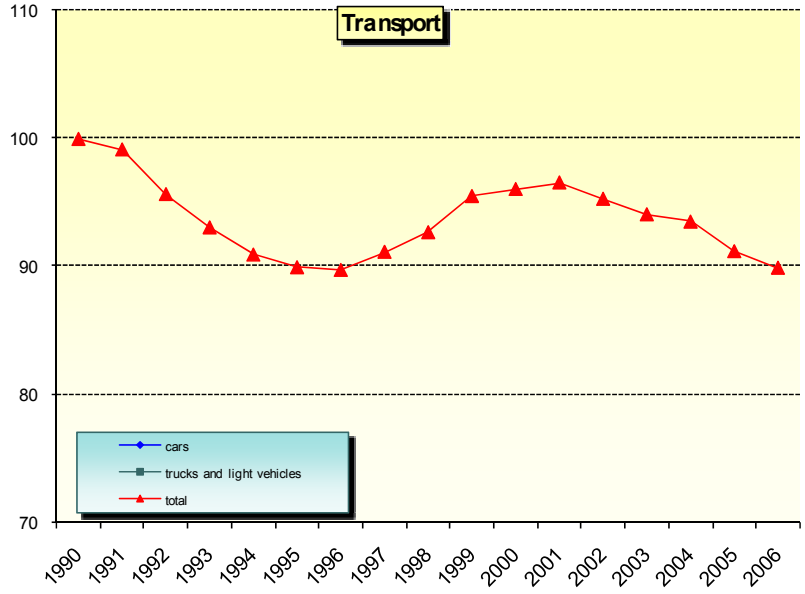


Figure 13 - Energy efficiency index for transports [Source: ODYSSEE]

Between 1990 and 2006 the transport sector shows an improvement in energy efficiency of 10%. This trend was related to the efficiency improvement in road transport, mainly due to renovation of national car stock, trough the application of legislative instruments, promoting the traffic circulation with new and more efficient car engines.

3.5 CO_2-emissions trends:

In 2007, total GHG emissions estimates, without Land Use, Land Use Change and Forestry (LULUCF), accounted for about 80 Mt CO_2e, an increase of approximately 33% relative to 1990. In accordance with the EU Burden Sharing Agreement[2] , Portugal has committed to limit its emissions growth to 27% relative to 1990 levels. Comparing the growth observed between 1990 and 2006 with the linear trend for the period 1990-2010, GHG emissions in Portugal were, by 2004, roughly 22% above target.

[2] Council Decision 2002/358/EC of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfillment of commitments there under.

Emissions increased at about 3% per annum throughout the period 1990-2004. The most significant source of GHG in Portugal is associated to the Energy sector and is directly related to the burning of fossil fuels. With 77% of the total 2004 emissions weighed by GWP[3], CO_2 is the most abundantly emitted GHG, 89,6% of which accrues to the Energy sector *[Source: Institute for the Environment, "Fourth National Communication to the United Nations Framework Convention on Climate Change, First National Communication in the context of the Kyoto Protocol", June 2006*].

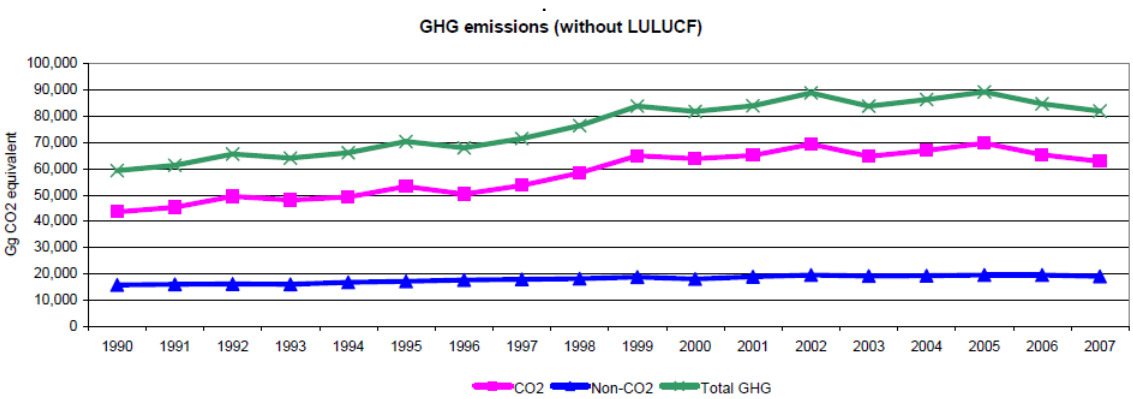


Figure 14 – [Source: Framework Convention on Climate Change]

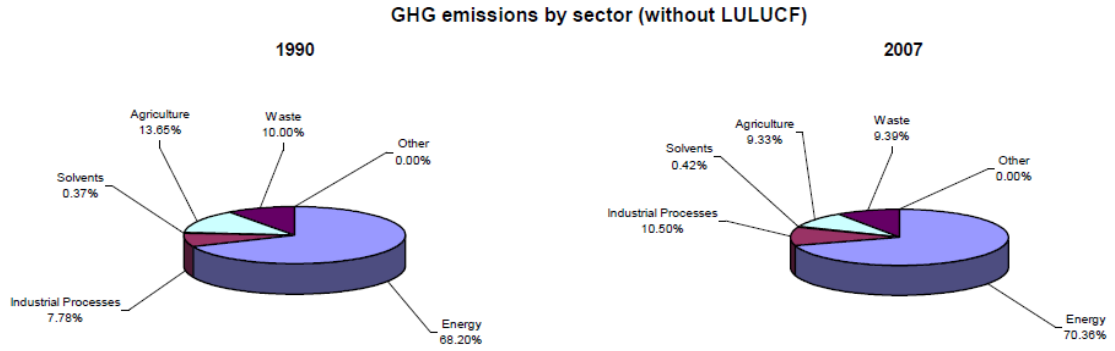


Figure 15 – [Source: Framework Convention on Climate Change]

Nevertheless, the total CO_2 emissions estimates, without the transformation sector, per unit of GDP ("CO_2 intensity"), decreased by almost 4% year, from 1990 to 2004. This gap is mainly due to energy sources diversification, with lower CO_2 emissions factors.

[3] Global Warming Potential.

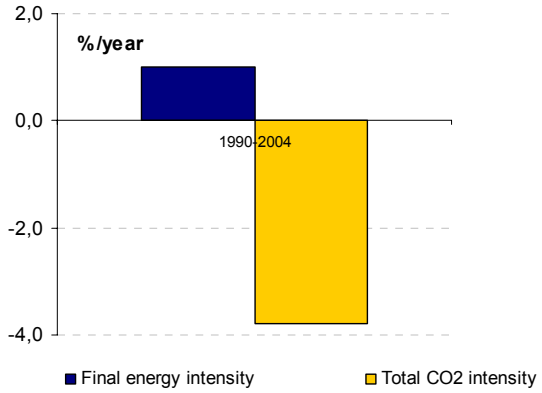


Figure 3 – Variation on CO_2 intensity in Portugal, 1990-2004

Except for the Agriculture and Industry sectors, all the others increase their CO2 emissions.

Despite the industry sector has the major share of CO_2 emissions in 2004, one should highlight that this sector had the higher decrease of gas emissions by 56% from 1990 to 2004. This fact came of the changes in this sector, mainly in the manufacturing industry, related with the rational use of energy that has taken place.

The next figure shows the evolution of the CO_2 emissions for the all sectors and final consumers, based in the year 1990.

Between 1990 and 2004, the CO_2 emissions of the total energy related of final consumers increased by 58%, from 22,3 Mtons to 35,2 Mtons.

In the same period the tertiary sector increased its emissions by 102,67%, while the transport and the household sector increased their emissions by 99,01% and 54,4%, respectively.

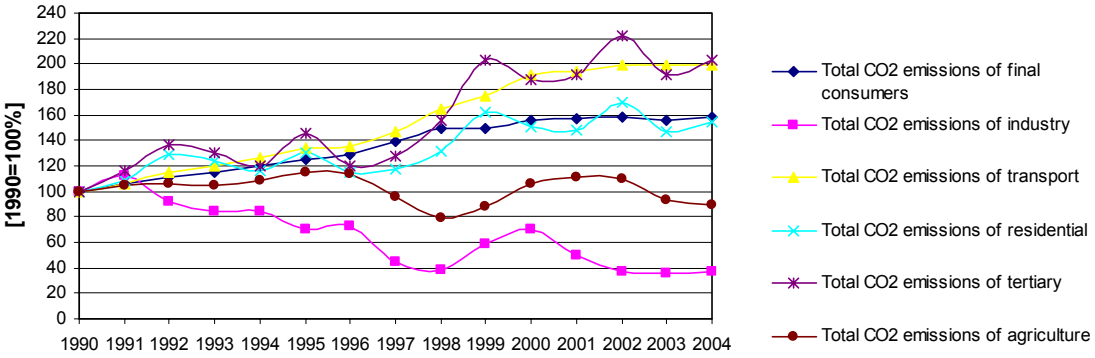


Figure 4 -CO_2 emissions by sector

The key drivers explaining the increase in national emissions for this period are, among others, economic growth and increase in energy demand, traffic volume and distances covered by road transport.

Weather parameters, such as precipitation, which have a high inter-annual variability, also have a significant influence on hydroelectric power production, thus influencing in a very significant manner the fluctuations in emissions. Portugal registered rapid economic growth in the 1990s, with GDP increasing by 41,32% between 1990 and 2005, an annual variation of 2,75%. Throughout this period, Portugal did not manage to decouple growth in emissions from economic growth.

However, there was a slight decrease in carbon intensity in recent years, a fact that may be explained by the implementation of some policies and measures with positive effects on GHG emissions such as the introduction of natural gas (1997), the introduction of combined cycle gas thermal electric plants, the progressive installation of co-generation units, energy and technology efficiency improvements in industrial processes and improvements in fuel quality.

The next figure shows the total CO_2 emissions of final consumers per capita and with climate correction. Both trends are very close over the period from1990 and 2004, what reflects that the clime didn't influence this indicator (degree-days have maintain more or less constant during this period).

From 1990 to 2004, both trends had an increase of emissions per capita by 48,5% (from 2,3 in 1990 to 3,4 tCO2/h in 2004), especially between 1990 and 1998. This is mainly explained by the energy consumption increase observed in almost all sectors of activity in the 90's.

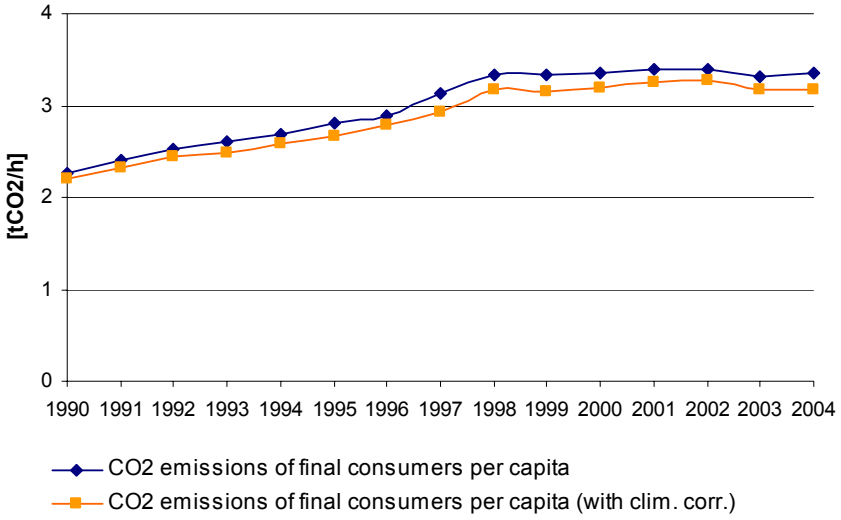


Figure 5 - CO2 emissions of final consumers per capita

4 Energy efficiency measures

4.1 Recent Energy Efficiency Measures

Residential and Tertiary Sector

With the introduction of the European Energy Performance Directive for Buildings (EPBD), on 4 April 2006, the Official Journal published three Decrees, setting out the framework for National System for Energy and Indoor Air Quality Certification of Buildings (SCE):

- Decree 78/2006 – It creates and defines the operational rules for the System for Energy and Indoor Air Quality Certification of Buildings (SCE) – articles 7 & 10;

- Decree 79/2006 – It establishes the new revision of the Regulations for HVAC systems, including requirements for regular inspection of boilers and air-conditioners (RSECE) – articles 8 & 9;

- Decree 80/2006 - It establishes the new revision of the Thermal Regulations for Buildings (RCCTE) – articles 3 to 6.

More recently, two other legislative documents were published: Portaria nº 461/2007 (5 June 2007) establishes the timetable for implementation of the certification process and Portaria nº 835/2007 (7 August 2007) defines the fee to be paid to SCE for the central registration and validation of certificates issued by qualified experts.

These new legislation establishes higher thermal requirements and adds strict indoor air quality requirements as well as maintenance and periodic inspections during the lifetime of HVAC systems. Within the new legal impositions it is worth to point out the mandatory use of solar collectors in buildings.

Under this new codes changes observed, although evolutionary, with improvements of the already existing codes; almost duplicating the thermal performance request in the new and renovated buildings, adding stricter indoor air quality requirements as well as maintenance and periodic inspections during the lifetime of HVAC systems, had also some innovative issues.

RCCTE 2006 imposes the usage of solar thermal collectors for hot water production if there are favourable conditions for exposure (if the roof or cover runs between SE and SW without significant obstructions) in a base of 1m2 per person (the total can be reduced to 50% if space is necessary for other important usages of the building).

For performance calculation of such systems, the certification according to the European Standards is needed. This performance calculation is done using a programme developed by INETI - Solterm programme. The installers of these systems must also be certified installers. The solar system must have a six year guarantee.

Control of the regulation is the responsibility of the City where the building is located, based on a Declaration of Compliance with the building regulations issued by an accredited expert registered in the SCE (Building Certification System). The implementation of these regulations is checked by these experts at several stages throughout a building's lifetime.

SCE came into force on 1 July 2007. The timetable to implement the SCE in various types of buildings is divided into three phases until its full implementation in January 2009, when all the required buildings will be included in the certification system: new buildings, major renovations, public buildings and all buildings when sold or rented. In the first phase, certification is only required for all new residential and non-residential buildings with a floor area larger than 1,000 m2 and requesting a construction permit after July 1, 2007. The second phase includes all new buildings, regardless of their floor area, when they request a construction permit after 1 July 2008.

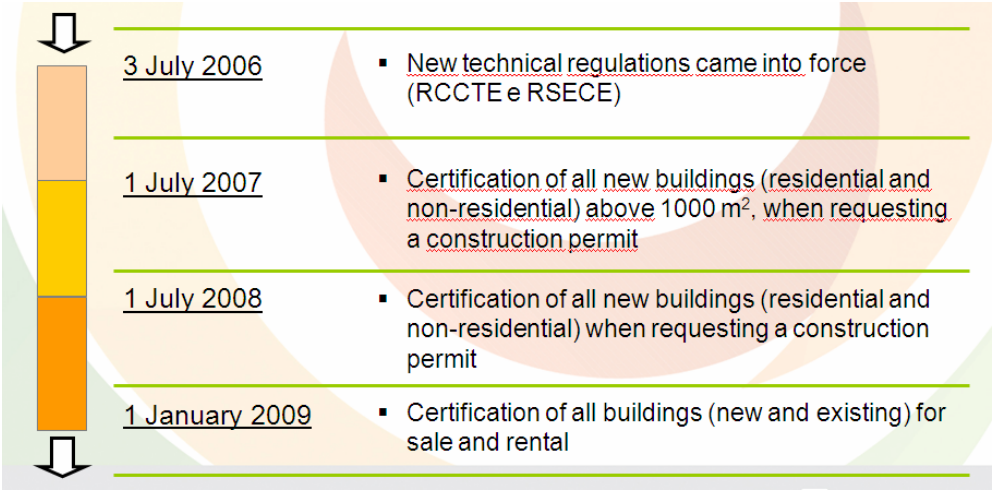
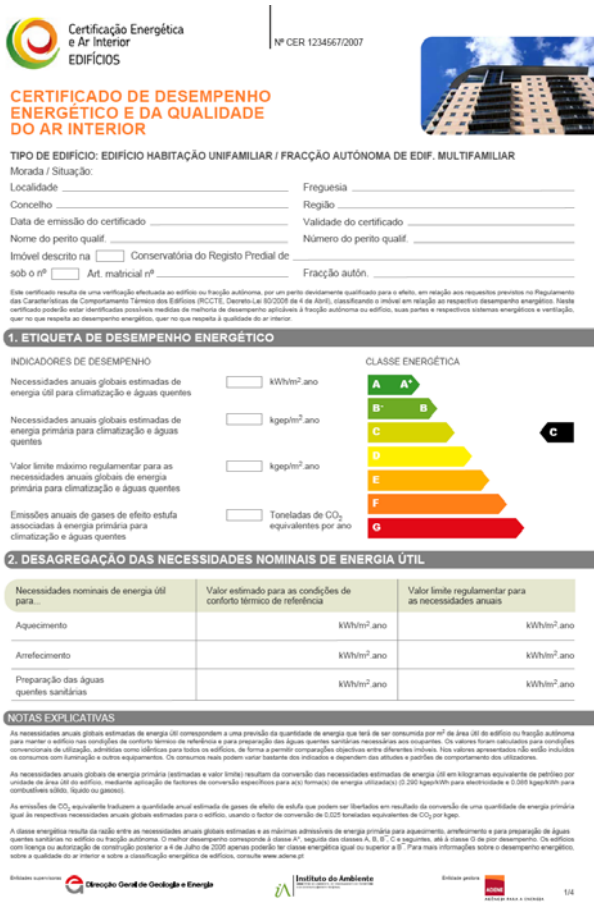


Figure 19 – Stages of implementation of new EPBD legislation

The system operates in conjunction with two sets of building regulations applied to construction, the Regulations on Thermal Behaviour of Buildings (RCCTE) and the Regulations on HVAC Systems in Buildings (RSECE).

The Energy Certificate is the most visible aspect of the SCE. This document will assign an energy performance label to residential and nonresidential buildings and it may list measures for improving their energy performance.

The energy label classifies the buildings on an efficiency scale ranging from A+ (high energy efficiency) to G (poor efficiency). This is similar to the scale currently used for some domestic appliances and equipment (although classes A and B are evenly subdivided in to classes A+, A, B, B-, to improve the distinction among new buildings – all new buildings must be in the A+ to B- classes) and it allows for easy reading and inter-pretation by the consumer.


Certificação Energética e Ar Interior
EDIFÍCIOS

Nº CER 1234567/2007

CERTIFICADO DE DESEMPENHO ENERGÉTICO E DA QUALIDADE DO AR INTERIOR

TIPO DE EDIFÍCIO: EDIFÍCIO HABITAÇÃO UNIFAMILIAR / FRACÇÃO AUTÓNOMA DE EDIF. MULTIFAMILIAR

Morada / Situação:

Localidade — Freguesia

Concelho — Região

Data de emissão do certificado — Validade do certificado

Nome do perito qualif. — Número do perito qualif.

Imóvel descrito na Conservatória do Registo Predial de

sob o nº Art. matricial nº Fracção autón.

Este certificado resulta de uma verificação efectuada ao edifício ou fracção autónoma, por um perito devidamente qualificado para o efeito, em relação aos requesitos previstos no Regulamento das Características de Comportamento Térmico dos Edifícios (RCCTE, Decreto-Lei 80/2006 de 4 de Abril), classificando o imóvel em relação ao respectivo desempenho energético. Neste certificado poderão estar identificadas possíveis medidas de melhoria de desempenho aplicáveis à fracção autónoma ou edifício, suas partes e respectivos sistemas energéticos e ventilação, quer no que respeita ao desempenho energético, quer no que respeita à qualidade do ar interior.

1. ETIQUETA DE DESEMPENHO ENERGÉTICO

INDICADORES DE DESEMPENHO

Necessidades anuais globais estimadas de energia útil para climatização e águas quentes — kWh/m².ano

Necessidades anuais globais estimadas de energia primária para climatização e águas quentes — kgep/m².ano

Valor limite máximo regulamentar para as necessidades anuais globais de energia primária para climatização e águas quentes — kgep/m².ano

Emissões anuais de gases de efeito estufa associadas à energia primária para climatização e águas quentes — Toneladas de CO_2 equivalentes por ano

CLASSE ENERGÉTICA

A A+ B- B C D E F G

C

2. DESAGREGAÇÃO DAS NECESSIDADES NOMINAIS DE ENERGIA ÚTIL

Necessidades nominais de energia útil para...	Valor estimado para as condições de conforto térmico de referência	Valor limite regulamentar para as necessidades anuais
Aquecimento	kWh/m².ano	kWh/m².ano
Arrefecimento	kWh/m².ano	kWh/m².ano
Preparação das águas quentes sanitárias	kWh/m².ano	kWh/m².ano

NOTAS EXPLICATIVAS

As necessidades anuais globais estimadas de energia útil correspondem a uma previsão da quantidade de energia que terá de ser consumida por m² de área útil do edifício ou fracção autónoma para manter o edifício nas condições de conforto térmico de referência e para preparação das águas quentes sanitárias necessárias aos ocupantes. Os valores foram calculados para condições convencionais de utilização, admitidas como idênticas para todos os edifícios, de forma a permitir comparações objectivas entre diferentes imóveis. Nos valores apresentados não estão incluídos os consumos com iluminação e outros equipamentos. Os consumos reais podem variar bastante dos indicados e dependem das atitudes e padrões de comportamento dos utilizadores.

As necessidades anuais globais de energia primária (estimadas e valor limite) resultam da conversão das necessidades estimadas de energia útil em kilogramas equivalente de petróleo por unidade de área útil do edifício, mediante aplicação de factores de conversão específicos para a(s) forma(s) de energia utilizada(s) (0.290 kgep/kWh para electricidade e 0.086 kgep/kWh para combustíveis sólido, líquido ou gasoso).

As emissões de CO_2 equivalente traduzem a quantidade anual estimada de gases de efeito de estufa que podem ser libertados em resultado da conversão de uma quantidade de energia primária igual às respectivas necessidades anuais globais estimadas para o edifício, usando o factor de conversão de 0.025 toneladas equivalentes de CO_2 por kgep.

A classe energética resulta da razão entre as necessidades anuais globais estimadas e as máximas admissíveis de energia primária para aquecimento, arrefecimento e para preparação de águas quentes sanitárias no edifício ou fracção autónoma. O melhor desempenho corresponde à classe A+, seguida das classes A, B, B-, C e seguintes, até à classe G de pior desempenho. Os edifícios com licença ou autorização de construção posterior a 4 de Julho de 2006 apenas poderão ter classe energética igual ou superior a B-. Para mais informações sobre o desempenho energético, sobre a qualidade do ar interior e sobre a classificação energética de edifícios, consulte www.adene.pt

Entidades supervisoras: Direcção Geral de Geologia e Energia; Instituto do Ambiente

Entidade gestora: ADENE

1/4

Figure 20 – National Energy Certificate

In Portugal, certification has been adopted by the market. Nearly all licensing (new buildings) and transaction processes (existing buildings) have a certificate

Transport Sector

Under the Ministries Council Resolution nº 161/2005, of 12the October, the current vehicle tax was amended. From the 1st of July 2006 on, the tax calculation formula includes also an environment component part, besides the cylinder capacity (CC) component.

The purchase tax on vehicles begins to be weighted according to engine size and CO2 emissions, being the weighting of the last, raised over time. So the integration of the environment part in the tax calculation formula will be made annually progressively, reducing the cylinder capacity component, favouring the less pollutant vehicles. This environmental component, represented by CO2 emissions, will be differentiated according to the type of fuel used, taking in consideration the environmental damages and harmful for the public health caused by the respective fuels consumption.

Initially the CO2 emissions will have a weigh of about 10 % on the purchase tax vehicle. However, it is expected that gradually the weigh will be increased:

- 2007 CO2 emissions represent about 30 %
- 2008 CO2 emissions represent about 60 %

In order to avoid any negative impact in the market, the Government will establish the suitable calendar for the beginning of the tax model to be in force, taking in consideration the adaptation of the representatives of vehicle's brands to this new rules.

The annual tax changes are to be included in the annual national Budget legislation. Specifically, in what respects 2006 budget, changes are in force from 1of July 2006, under Law 60-A/2005, December 30th , in what respects 2007 budget, changes are in force under Law nº53-A/2006 of 29 December 2006.

The Vehicle Taxation Reform was enacted by Law 22-A/2007, of 29 June, and entered into force in July 2007, creating the Vehicle Tax Code (ISV) and the Road Tax Code (IUC) while abolishing the Automobile Tax (IA), the Municipal Vehicle Tax (IMV) and the Road Usage and Haulage Tax (ICi and ICa).

As such, the most significant amendments are regarding:

- An increase in the proportion of the tax based on environmental factors, such as carbon dioxide (CO2) emissions, from its current weighting of 10% to 30% and later 60%;
- The spread of vehicle taxation over two periods, with some of the tax burden involved in purchasing a vehicle (ISV) being transferred to the period of usage (IUC).

IUC is charged based on ownership, with the vehicles identified (cars, motorcycles, boats, planes) classed into seven categories, from A to G, each with its own specific rates.

The EU Directive 2003/30/EC on the use of biofuels in the transport sector has been transposed to the Portuguese legislation, under Decree-law nº62/2006 21st March, providing for the following measures to promote the use of biofuels:

- The possibility of imposing minimum quotas for the incorporation of biofuels in fossil fuels if biofuel incorporation the previous year was considerably lower than expected;
- The conclusion of agreements for the use of biodiesel in public passenger transport and goods transport fleets, with a percentage rate of biodiesel incorporation in fossil fuels above 10%;
- The creation of the title of 'dedicated small producer' for firms producing up to 3 000 tonnes annually from waste materials or by means of technological development projects based on products that are more more environmentally friendly.

Together with this legislation it was also published a specific Decree-law establishing the fiscal incentive for the biofuels promotion (Decree law nº 66/2006, 22nd March). Biofuels profit from total exemption (for dedicated small producers - until a maximum of 15.000 tons biofuel/year) or partial exemption on the excise tax ISP (tax rate on oil products) of about 0.28 - 0.30 EUR/ litre, depending on the prices of biofuels, their feedstock and fossil fuels.

The total or partial exemption was allowed for a maximum period of six years, and is applied to pure biofuels or when blended to petrol or diesel.

Order in Council No 1554-A/2007 of 7 December 2007 set the quantities to be exempted and the corresponding access conditions for the years 2008 to 2010.

The national indicative target for the placing on the market of biofuels and other renewable energies for transport purposes was increased for 2010 by the Council of Ministers Resolution from 5.75% (Resolution No 119/2004 of 31 July 2004) to 10% (Resolution No 1/2008 of 4 January 2008).

Decree-Law No 89/2008 was published on 30 May 2008, laying down fuel specifications and providing for the placing on the market of fuels with a 10%, 15% and 20% biofuel mix.

In order to place on the market fuels with larger biofuel contents than those permitted by Standards EN590 and EN228, a warning must be given to consumers instructing them to check the compatibility of their vehicles.

It is expected that, in 2008, no more than 200 million litres of biodiesel will be released for consumption. [SOURCE: DGEG - FIFTH NATIONAL REPORT ON PROMOTING THE USE OF BIOFUELS OR OTHER RENEWABLE FUELS IN TRANSPORT IN PORTUGAL – DIRECTIVE 2003/30/EC].

Industrial Sector

The Intensive Energy Consumption Management System (SGCIE) was published on 15 April 2008, trough Decree-Law 71/2008, being one of the measures of the PNAEE - National Action Plan for Energy Efficiency that results of an extension up to 2015 of the measure of the PNAC 2006 (Climate Changes Plan), relative to the revision of the RGCE- Regulation of Energy Consumptions Management.

The objective of this measure is to promote the increase of energy efficiency through the modification of production processes, the introduction of new technologies and the behaviors changes.

The SGCIE applies for all companies and facilities that have an annual consumption over 500 toe/year, imposing binding energy audits, with a 6-year periodicity, in energy-intensive facilities with consumption above 1000 toe/year, and a 8-year periodicity for energy audits to facilities with energy consumption between 500 and 1000 toe/year.

Facilities under the National Allocation Plan for Emission Allowances (PNALE) are not covered by SGCIE, but they may participate on a voluntarily basis, as can facilities with annual energy consumptions lower than 500 toe.

Intensive energy users are obliged to elaborate and execute Energy Consumption Rationalization Plans (PREn), establishing targets for energy and carbon intensity and specific energy consumption, which also outlines energy rationalization measures. The Plan must be submitted to the DGEG through an online system (www.adene.pt/SGCIE) to the Directorate General for Energy and Geology (DGEG), as well as submit as biennial execution and progress reports. Upon DGEG´s approval, as the competent authority that supervises and inspects the SGCIE's operation, the PREn become a Rationalization Agreement for Energy Consumption (ARCE).

The ARCE provides facility operators with excise duty exemptions (ISP) on oil and energy products (coal, oil coke, fuel oil and oil gases), as well as possibility to apply for incentives on energy audit costs and on investments in energy management and monitoring equipment.

Exemptions in excise duties are foreseen in the national budget for fuels used either by consumers committed to the reduction of CO2 emissions in the framework of the National Allocation Plan for Emission Allowances (PNALE) or by consumers that have a Rationalization Agreement for Energy Consumption.

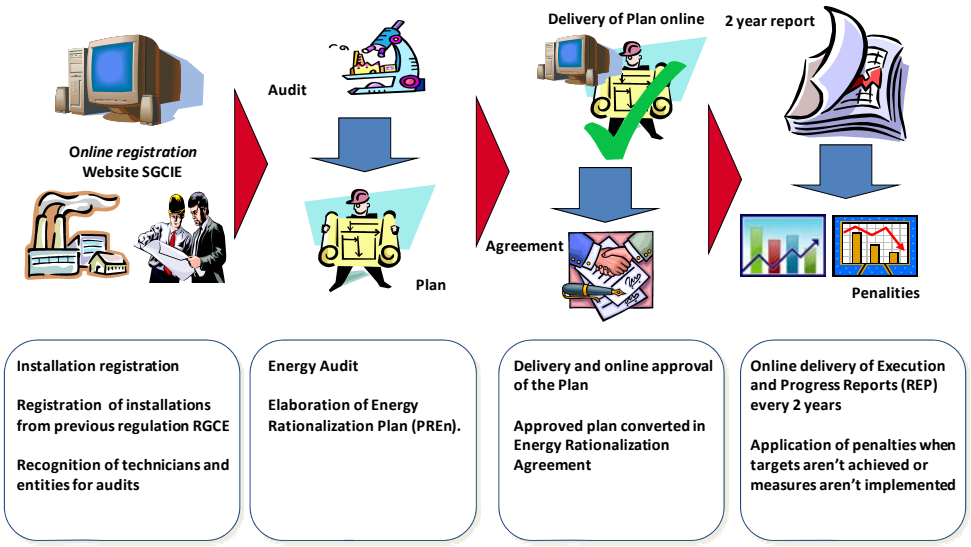


Figure 21 - SGCIE Synthesis of application

The aggregate value of ISP exemption has greater impact on consumers of fuel oil in a total value of 760,000 Euros.

As mentioned before by the end of each PREN period operators must reduce their target indicators in 4% or 6% depending if they have reference energy consumptions over 500 toe/year or under 1000 toe/year respectively.

To fulfill their obligations under the SGCIE the operators must rely on technicians or entities duly authorized for the preparation of energy audits and plans for rationalization, and to monitor its implementation and progress, including the preparation of reports on implementation and progress.

The technicians that are interested in being accredited must submit requests for approval to ADENE and DGEG, demonstrating that they meet the minimum academic and professional qualification and experience appropriate to the objectives in question.

Until February of 2009 were recognized, 189 technicians or entities. As can be seen most of the technicians or entities come from the previous regulation since the transition was automatic.

Cross-cutting measures

Resolution of the Council of Ministers (RCM) No 169/2005 of 24 October 2005 laid down a National Energy Strategy with the following objectives:

- To ensure security of energy supply by diversifying primary sources and energy services and promoting energy efficiency throughout the supply and demand chain;

- To stimulate and foster competition with a view to protecting consumers and promoting competitiveness and efficiency in enterprises both in the energy sector and in Portugal's production sectors;
- To provide for an environmentally friendly energy process as a whole by reducing the impact on the environment at local, regional and global level, in particular in terms of the carbon intensity of GNP.

To achieve those aims, the National Energy Strategy involves various policy strands, which will translate into instruments to be defined and adopted by legislative and regulatory means. The policy guideline for renewables involves expanding these energy sources, in particular by stepping up and diversifying the use of renewable sources of energy to produce electricity, with special focus on wind power and hydroelectric potential still to be exploited, and raising the target for wind power to 5 100 MW. The following measures were taken in accordance with those guidelines:

- Decree-Law No 33-A/2005 of 16 February 2005 revised the prices paid for energy produced by renewable-energy power plants and delivered to the public electrical grid, and laid down the procedures for allocating the power available on the grid and the time required to obtain authorisations to establish such power stations.
- A public call for tenders was published in July 2005 under Decree-Law No 33-A/2005 for the supply of 1 800 MW of electricity to the public electrical grid from new wind farms.
- A public call for tenders was published in March 2006 under Decree-Law No 33-A/2005 to deliver 100 MW of electricity to the public electrical grid from 15 thermoelectric power plants using forest biomass, with special emphasis on priority areas for the management of forest fuel where there are no investment plans as yet. The aim is to promote the valorization of forest biomass in conjunction with the timber and paper-pulp industries. The call seeks to achieve two aims: to increase the share of electricity generated from renewables through a network of forest-waste collection plants and to contribute to keeping forests clear and so reduce the risk of forest fires. The forecast is for annual consumption of around one million tonnes of waste from forest management and production activities.
- Contracts for reception points for 922 MW from major new hydroelectric plants were awarded at an estimated investment of over €1 billion.
- A licence was awarded for the establishment of the Moura photovoltaic power plant, Europe's largest, with forecast production of 76 GWh a year.
- Work was begun on a maritime area for the establishment of pilot projects to develop new technologies utilising this energy potential and permitting the establishment of an industrial cluster dependent on wave energy.

Operation commenced of the world's first wave-power plant with a capacity of 4 MW.

Under Order-in-Council No 736-A/2006 of 26 July 2006, CEO (Companhia de Energia Oceânia S.A.) was authorised to install the infrastructure for an electricity generating system that harnesses sea-wave power using Pelamis wave-energy converters in a public maritime area off Aguçadoura (on Portugal's central-western coast).

Law No 57/2007 of 31 August 2007 provides the legal basis for government use of public maritime areas, including territorial waters, for the production of electricity from sea-wave power in an area demarcated to that end.

- In early 2007 new targets for renewable energy were approved:
    - Electricity generated from renewable energy sources is to rise from 39% to 45% of consumption in 2010, with significant development of all sectors;
    - Biofuels are to rise from 5.75% to 10% of road-transport fuel consumption in 2010;
    - 5% to 10% of the coal used in the Sines and Pego power plants is to be replaced by biomass or waste by 2010.
- Decree-Laws Nos 101/2007 of 2 April 2007 and 288/2007 of 17 August 2007 lay down amendments and provide for measures to simplify and streamline licensing procedures in the electricity sector, and in particular in renewable-energy plants.
- Decree-Law No 225/2007 of 31 May 2007 amending Decree-Law No 33-A/2005 of 16 February 2005 provides for a set of measures involving renewables under the National Energy Strategy, and in particular clarifies the procedure for assessing environmental impact, revises the criteria for paying for energy produced from renewables and simplifies licensing procedures.
- A plan was drawn up with a view to building 10 new dams (+ 1 000 MW) in addition to the Baixo Sabor dam.
- The government approved a new simplified system for the production of electricity using micro-generation plants, also known as "Renováveis na Hora" ("instant renewables").
- · Consideration was given to tax breaks for renewables in the 2008 state budget.

[Source: Directorate-General for Energy and Geology- Third report on progress towards achieving the indicative targets for electricity production from renewable energy sources in Portugal].

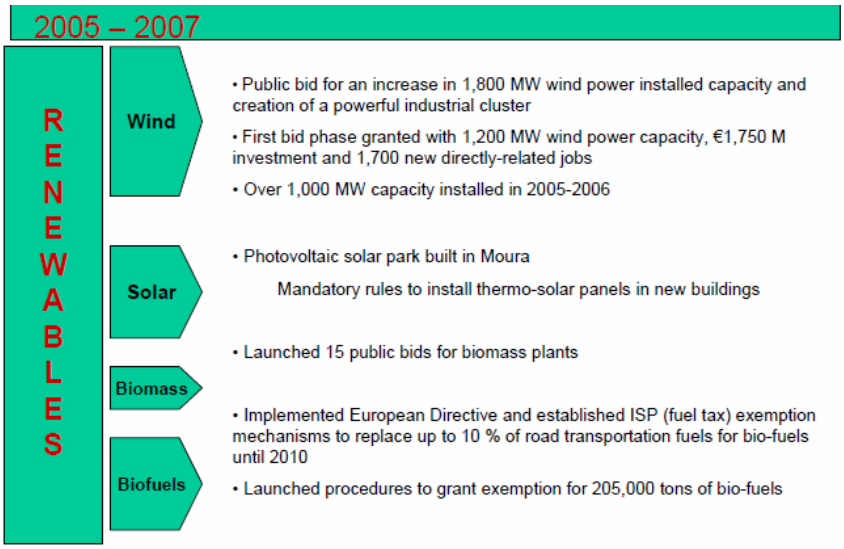


Figure 22 - SGCIE Synthesis of application

4.2 Patterns and Dynamics of Energy Efficiency Measures

In this section it is made an energy efficiency "measure counting" in the five main demand sectors; residential, industry, transports and tertiary, plus a general cross-cutting section. This examination is based on the Mure Database on energy efficiency M&P4, available on the internet for Portugal. This database covers a number of rational energy related policy measures, a coverage that has been updated over the years (www.mure2.com).

The total number of measures available in the database by sector, up to 2007, are:

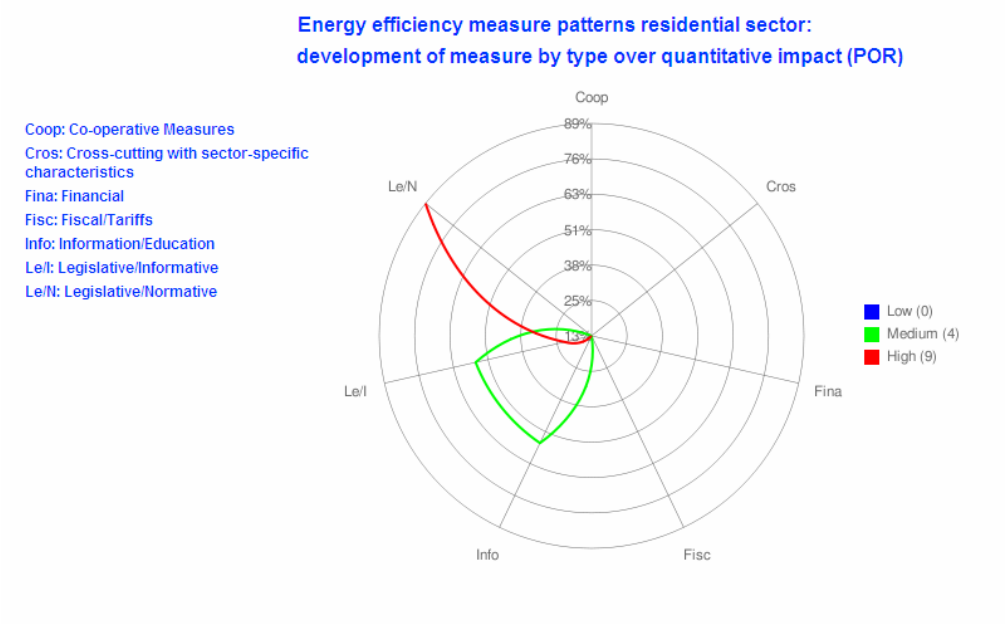
Household	9
Tertiary	10
Transports	8
Industry	3
General "cross-cutting" measures	6

In Annex 2, it is presented a summary of each measure with detailed information.

In the following figure it is represented the dynamics of the national energy efficiency measures from 1990 to 2007 (national measures and those triggered by EU measures) in the different demand sectors.

4 M&P- Measures and Policies

The following diagrams are shown in the form of a spider's web with measure types on the spokes of the web, by quantitative impact. The greater the preference for a certain measure type, the more the pattern will resemble the hands of a watch indicating the preferences.



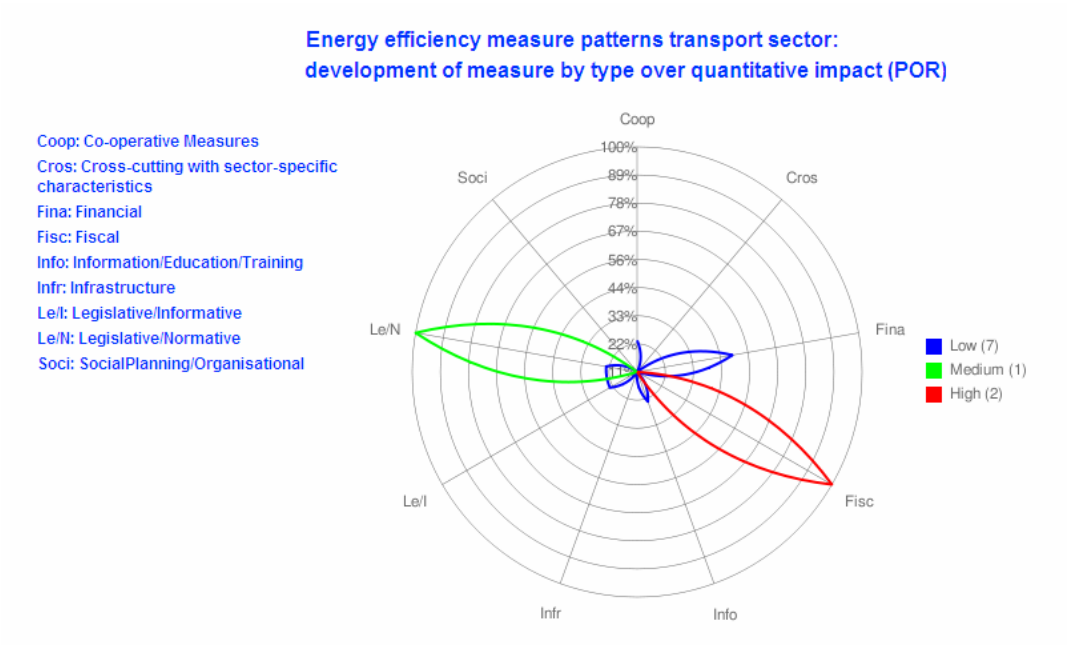
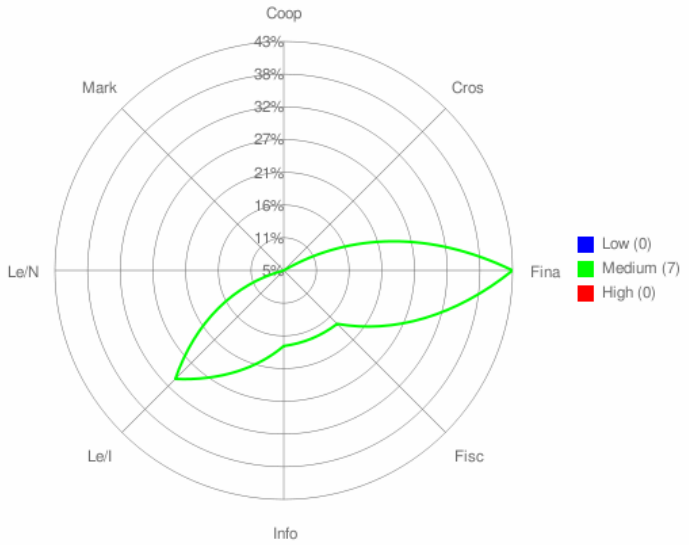


Figure 24 – Transport spider diagram

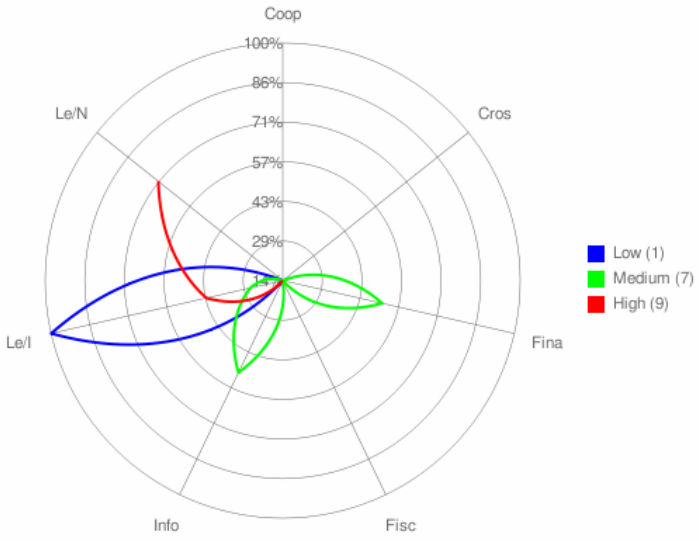
Energy efficiency measure patterns industry sector:
development of measure by type over quantitative impact (POR)

Coop: Co-operative Measures
Cros: Cross-cutting with sector-specific characteristics
Fina: Financial
Fisc: Fiscal/Tariffs
Info: Information/Education/Training
Le/I: Legislative/Informative
Le/I: Legislative/Informative
Mark: New Market-based Instruments



Energy efficiency measure patterns tertiary sector:
development of measure by type over quantitative impact (POR)

Coop: Co-operative Measures
Cros: Cross-cutting with sector-specific characteristics
Fina: Financial
Fisc: Fiscal/Tariffs
Info: Information/Education/Training
Le/I: Legislative/Informative
Le/I: Legislative/Informative



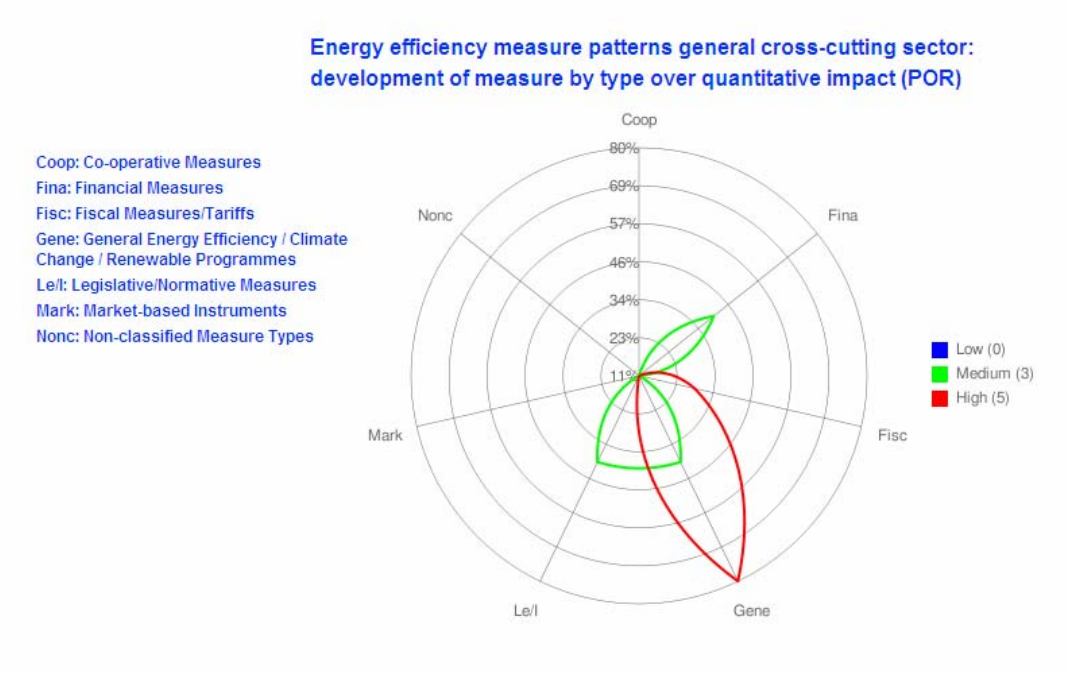


Figure 63 – Patterns of policy and measures by different sectors 2007

4.3 Innovative Energy Efficiency Measures

In March 2008 a tax on less efficient lamp bulbs was implemented (DL nr 108/2007, from 12/04):

- Fluorescent lamp bulbs: € 0.41/unit
- Mercury steam lamp bulbs: €6.77/unit.

The outcome of the tax reverts to the energy efficiency measures foreseen in PNAEE and in the Carbon Fund.

Trough the Lighting Renewal Programme, as part of the Action Plan, in September 2008 the Portuguese government began the phase-out of incandescent light bulbs, trough the large-scale substitution of incandescent light bulbs with CFLs in Buildings.

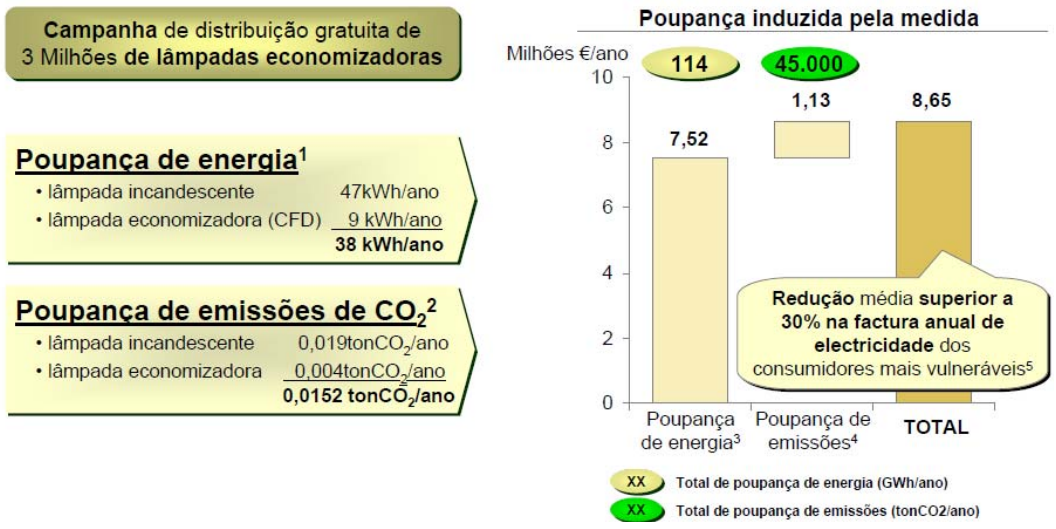


Figure 74 – Lighting Renewal Programme impact

Note also goes to the Ministry of Economy and Innovation "Road show", namely a Renewable Energy Truck travelling around Portugal for 2 months (from 18 July to 19 September and terminating in Almada); it visited 45 cities where over 30,000 visits were made promoting the exchange of filament lamps for low consumption lamps. Information sessions were given on energy efficiency to make people aware of and motivate the use of renewable energy through the Thermal Solar Programme 2009.

New policies and measures recommended in the National Climate Change Programme have been developed. With regard to the energy field, continuous investment has been made in renewable energy resources, especially wind power, licensing of new natural gas combined cycle plants, which are more efficient in producing electricity.

The expected results/impacts up to 2010 are as follows:

- Wind Energy: creation of an industrial cluster with a total investment of €1750m, creation of roughly 1700 work posts and the setting up of a fund of €35m for innovation in the area of renewable energies;
- Forestry Biomass: an estimated investment of around €225m and the creation of roughly 700 work posts;
- Biofuels: creation of industrial unit with an estimated investment of €100m;
- Water: Authorised Reception Points for 922 MW of new large Hydroelectric Power Stations with an estimated investment of more than €1000m;

- Wave Energy: creation of a pilot zone with potential exploration of up to 250 MW for the technological development of new technologies pilot projects and the drawing up of legislation regulating the respective authorisations (licences and concessions);
- Photovoltaic: Moura Power Station with a forecast production of 56 GWh/year, the setting up of a photovoltaic module factory and a research laboratory. Serpa Power Station with a forecast production of over 18 GWh/year;

The following picture shows the national impact of renewable energies as key economic, environmental, social and technological development drivers.

	Investment (2005 to 2012)	New direct jobs creation	CO_2 reduction(3) in 2010 (Total renewables included)
Wind	€5.1bn	2,500	5.8 Mt
Hydro power	€1.0bn	4,500	6.7 Mt
Biomass	€0.5bn	500 – 1,000	0.7 Mt
Solar	€0.5bn	100(1)	0.1 Mt
Waves	€0.15bn	n.a.	0.03 Mt
Biofuels	€0.3bn	300(2)	2.3 Mt
Biogas	€0.3bn	n.a.	0.15 Mt
Micro-generation	€0.25bn	750	0.03 Mt
Total	€8.1bn	9,700	~13.7 Mt

(1) Moura plant; (2) Applicable to transformation plant units

(3) Emission factor of 0.5 ton/MWh

Figure 25 - [source: DGEG – Energy Policy 2008]

As regards micro-generation, a simplified legal licensing system was implemented, substituting the existing one with a registration system subject to an inspection of technical conformity.

The System for the Registration of Micro-production (SRM), from renewable energy sources was regulated under the provisions of Decree-Law, no. 363/2007, November 2nd, and became effective on April, 2008, covering renewable energy sources as solar, wind, hydro, biomass, and fuel cells using hydrogen from renewable energy microproduction, and cogeneration.

This legislation provides a simpler simplified licensing process for any entity with a contract for purchasing low-voltage electricity, through an electronic platform through with producers register their installations, subject to technical compliance inspection. The microgeneration installations are limited to half of the installed rate power in the households, with a maximum limit of 5,75 kW in the general regime and 3,68 kW in the bonified regime (except in the case of installations for condominiums).

The tariff under the general regime is equal to the cost of electricity sold under the purchasing contract. As an alternative the bonified tariff regime establish a special reference tariff of 650 €/MWh valid during the first 5 years following the installation year, decreasing 5% for each additional 10 MW registered in the SRM.

The reference tariff applies differently depending on the conversion technologies that use renewable energy sources. It is 100% for solar, 70% for wind, 30% for hydro, cogeneration and biomass. For fuel cells, the tariff is the one that applies to the renewable energy source used for hydrogen production.

Solar energy uses for space heating and hot water production is mandatory under the bonified regime. A minimum of 2 m^2 of solar thermal collector area should be installed in the same building as each microgeneration plant.

The Portuguese government prepared during 2008 the introductions of direct incentives for the purchase of solar thermal systems as a way to reduce the costs of solar thermal systems, thereby helping to surpass the high initial investment associated to their acquisition.

Up to 50 % of the cost of the full solar thermal system and installation services, with a maximum amount of 1.641,70 €, will be granted over this initiative. The incentive will be made available trough bank credit agreements.

The final objective to achieve is the creation of a sustained market, representing installation of 175.000 m2 of solar collectors per year, which will result in approximately 1.4 million m2 of installed operational collectors by 2015, corresponding to approximately 1 in 15 buildings with Solar Thermal systems.

Estimated energy savings associated to installation of solar thermal systems, corresponding to the indicated area, are 58,796 toe, in 2015, for the residential and service sectors.

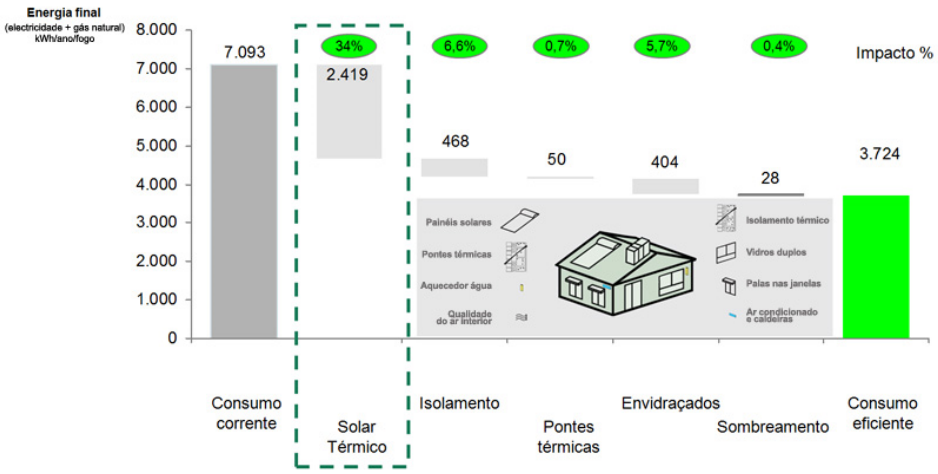


Figure 26 - Solar thermal impact in the household consumption [Source: MEI Medida Solar Térmico 2009]

4.4 Energy efficiency measure evaluations

4.4.1 Semi-quantitative Impact Estimates of Energy Efficiency Measures

Trough the Lighting Renewal Programme, over 4 million free high-efficiency light bulbs were distributed to 13 per cent of households in the country, leading to an energy saving impact of 13.592 toe in the residential sector.

In the first half of 2009, thermal solar systems were installed in roughly 20,000 homes under the Thermal Solar Programme; this corresponds to over 65,000 m^2 of solar panels installed and a total investment of roughly 65 million euros with 50% State participation.

There are currently 6262 certified installers (2362 registered in 2008 and 3900 since January 2009). These technicians are qualified to install solar panels in accordance with the quality level required by the Thermal Solar Programme.

43 equipment brands have qualified for the Thermal Solar Programme 2009, notably SMEs and the number is expected to rise to 50 by the end of September. 12 banks and their respective branches have also joined the Programme.

With regard the impetus to industry provided by the Programme, new solar panel factories have opened and 3 new cylinder production units and emphasis must be given to the dynamics created in the target component, equipment installation and maintenance and support structure assembly activities.

Since the System for the Registration of Micro-production came into force, in April 2008, over 6.584 registrations were made, resulting on the assignment of a total electric power of 11.792 kW.

Solar thermal micro-generation is also encouraged under SCE regulations which value the use of energy sources with lower impact, in terms of primary energy consumption when determining the energy performance of the building.

An energy saving impact of 1.114 toe was measured under this programme.

Statistical data Microgeneration					
Bonified regime					
Phase	Date	Issued Registrations		Purchased Registrations	
		Quant.	Power (kW)	Quant.	Power (kW)
1ª	02-04-2008	657	2.261	374	**1.306**
2ª	05-05-2008	700	2.263	395	**1.369**
3ª	09-06-2008	641	2.164	365	**1.270**
4ª	07-07-2008	766	2.701	394	**1.392**
5ª	09-09-2008	581	1.990	342	**1.163**
6ª	02-10-2008	777	2.657	487	**1.694**
7ª	29-10-2008	817	2.817	454	**1.592**
8ª	27-11-2008	829	2.918	436	**1.547**
9ª	21-01-2009	816	2.867	131	**459**
Total		**6.584**	**22.638**	**3.378**	**11.792**

Table 1 – Number of microgeneration registrations issued and paid in 2008

Under the National Energy Certification and Quality of Air in Buildings System (SCE), there were more than 13.900 Energy Certificates registered until the end of January 2008, on a web based central registration system that qualified experts must access and use to issue certificates.

Since SCE became applicable to all new buildings, regardless of their size or purpose, from July 2008, more than 85% of all building transactions are being electronically certified under the Energy Performance Building Certification (new and existing homes).

About 12.000 Declaration of Regulation and Conformity and 721 Energy Efficiency Certificates were issued in 2008, generating savings of approximately 4.313 toe.

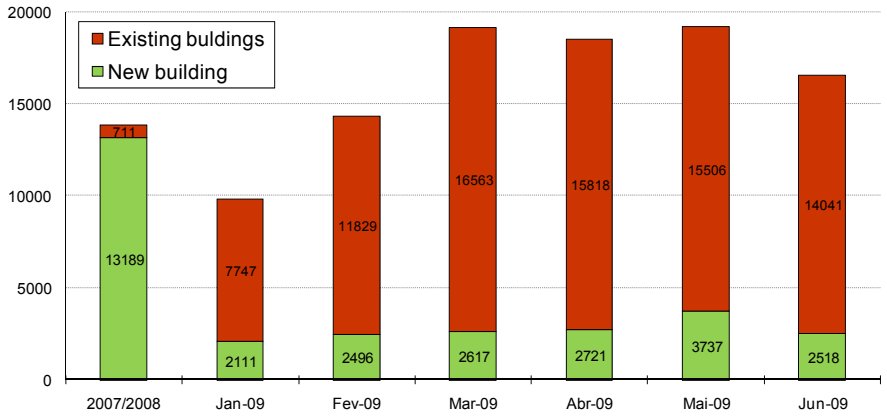


Figure 27 - Number of certificates issued [Source: Asiepi - Portugal Impact, Compliance and control of Legislation]

The Intensive Energy Consumption Management System Programme came into force in June 2008, taking over after the prior Regulation on Management of Energy Consumption. About 69.651 toe of energy savings were generated under this framework

The transport area had a further decrease of 1.414 toe in its final energy consumption in 2008, based the combined measures of Rolling Resistance, which consist on voluntary agreements for factory versions of vehicles to include efficient tyres, and Right Pressure, which comprises awareness campaigns aimed at correct tyre pressure and tyre calibration and incentives to periodic tyre pressure checking.

In the year of 2008, the measures aimed at the decommissioning of end-of-life vehicles and the review of the private vehicle tax regime had an energy saving impact of 1.570 toe.

Most of this was obtained trough an increased demand for less polluting and more energy-efficient vehicles, as a result of the inclusion of a CO2 emission factor in the vehicle tax (ISV) and unique circulation tax (IUC) calculations.

The Vehicle Tax (ISV) was partially replaced with the unique circulation tax (IUC), making new vehicles more attractive.

The CO2 emission factor in the vehicle tax rose to 60% of the total tax income in January 2008. A 50% reduction in ISV was implemented for hybrid vehicles.

In relation to bio fuels, Portugal's community target is to incorporate 5.78% of bio fuels in road fuels, in 2010. Portugal currently has five industrial installations in operation for the production of bio diesel that produced 164 million liters in 2008, in addition to the 4.16 million litres produced by nine small producers.

From the 1st January 2008 to the 31st December 2010 a partial exemption of ISP (tax on oil and energy products, conceded under the conditions of Order in Council nr 1554-A/2007, dated 7/12),

which taxes bio fuels that substituted road fuels, will be in place. In January 2009 (Order in Council nr 13/2009, dated 13/January), the amount of ISP exemption on bio fuel that substituted road fuel was established € 280/1000 l.

In February 2009 it became mandatory for a minimum of 6% bio fuel to be incorporated in road fuel (DL nr 49/2009, dated 26/February). [SOURCE: LISBON STRATEGY AND TECHNOLOGICAL PLAN]

4.4.2 Lessons from Quantitative Energy Efficiency Measure Evaluations

Evaluation of building regulation

The adoption of the updated Energy Performance (EP) requirements and of the certification process in Portugal has been quiet successful.

By comparing the monthly number of certificates issued for new buildings, with the government figures on new construction licenses issued in the same period, it is possible to realise that, consistently and for the last 6 to 12 months, more than 90% of cases been subject to certification. The strong effort made by ADENE to explain the certification process to Municipalities and promoters has paid off: practically all municipal services have effectively included the certificate in the list of documents required in a licensing process and most promoters are now fully aware of the need to comply with EP requirements.

For the specific case of new buildings, the system has been established in a way that municipalities don't have to perform any technical verification of compliance with EP requirements. Such verification is done by the qualified expert (both in the project phase and at the end of construction) who then issues the declaration or certificate that proves compliance. The quality of the expert's work is checked by ADENE, based on random sampling and other criteria.

In the case of existing buildings, the need to have a valid certificate to sell a house has been adopted also to nearly full extent: the monthly number of certificates issued for existing buildings is quite similar to the estimated number of sales taking place each month. Prior to the beginning of 2009, ADENE has approached the key players in this area (public and private notary, real state agencies, banks, etc.) to assure they were aware of changes and to get their involvement and support to certification. These and other actions provided a suitable framework that, even in a market crises situation, allowed a fast adoption of certification. However, despite this success in the sales market, the rental market (although a minority when compared to sales) is still a challenge that needs to be tackled.

The existing legislation predicts financial penalties and sanctions for building owners and qualified experts in case of non-compliant to EP and certification requirements. Penalties range from €250 to nearly €45 000. Different sanctions are also predicted, like closing the building or suspending the

activity of the expert. So far, no penalties have been applied, although there are already some on-going processes arising from quality checks of the expert's work. [*SOURCE: ADENE - ASIEPI REPORT – PORTUGAL: IMPACT, COMPLIANCE AND CONTROL OF LEGISLATION*]

Evaluation of energy audits in the building sector

The EP requirements for new buildings and major renovations will certainly bring important energy savings in the near future. Maintaining thermal confort and indoor air conditions will require less energy, as new and renovated buildings become more and more efficient.

But new and renovated buildings only make up a small share of the entire building stock in Portugal (around 5.5 million homes). Currently, less than 50 000 new buildings are built each year in Portugal and, despite the recent growth in the rehabilitation market, major renovations still don't have a significant expression. Therefore, the impact of applying EP requirements in new and renovated buildings is obviously limited and will not lead, in usefull time, to a relevant reduction in energy consumption in the building sector.

So, to achieve real energy savings in this sector, there has to be good incentives to the improvement of existing buildings. And certification can play a crucial role in this matter. The recommendations made by the experts in the certificate are important guidelines that the onwer of the buildings can make good use of, either in the context of a renovation, or as individual cost-effective measures.

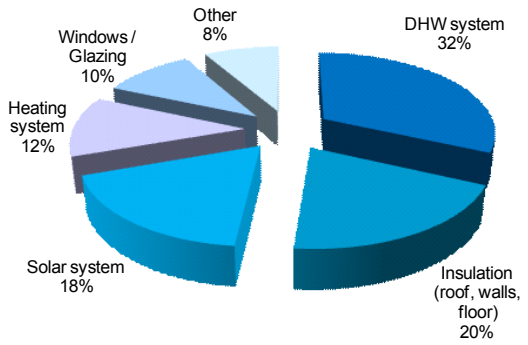


Figure 28 – Recommendation made by experts [Source: Asiepi - Portugal Impact, Compliance and control of Legislation]

By analysing the certificates issued in Portugal for existing buildings in the first 6 months of 2009, it can be seen that about 40% are rated above the treshold for new buildings (B-). If all the recommendations for improvements made by the experts in each certificate were actually implemented, then about 86% of the existing buildings would have, at least, the same energy performance as new buildings (in terms of primary energy consumption per square meter of floor area). For that, an average investment between €1250 and €6500 per building would be required, for a average pay-

back period for investment of 6 to 11 years. And, in this scenario, Portugal could save about about 0,4 toe of primary energy per building per year.

The following Figure illustrates the potential shift in the distribution of energy rates for existing residential buildings, as it would result from the actual implementation of all the recommendations made by experts in the certificates issued in the first six months of 2009.

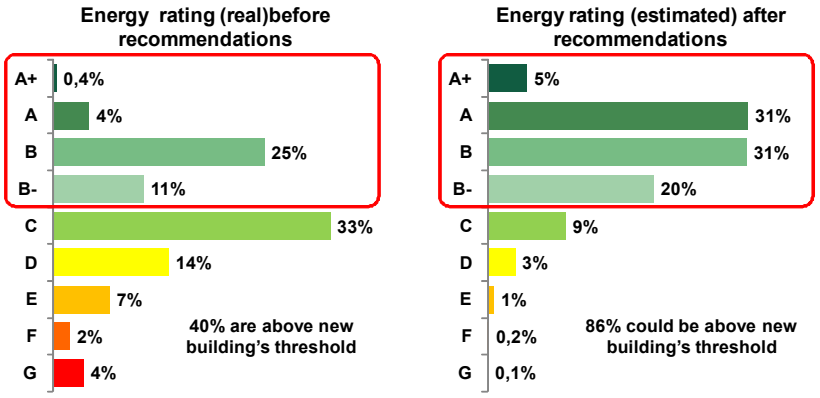


Figure 29 - Potential shift in the distribution of energy rates [Source: Asiepi]

Although theoretical, this analysis emphasises the importance of implementing the recommendations made by the experts in the certificate and how these measures need to go from paper to practice.

Therefore, a crucial aspect for the credibility and future of the energy efficiency legislation in Portugal is the quality control or fiscalisation of the expert's work, which is performed by ADENE as the system's managing authority. Such a control mechanism leads a lot of (positive) pressure in the entire system, increasing the level of compliance of the different technical agents involved, particularly engineers and architects. By the end of 2009, close to 4% of the certificates issued each month will be subject to a detailed quality control. Currently, about 2000 fiscalisations (between 2 and 3% of all certificates issued) are at different stages of processing.

This detailed control involves visiting the site and performing parallel analyses of the certified building. Results of this evaluation are compared with the initial expert's work. If relevant mistakes are detected, the expert is asked to correct the certificate and is also subject to penalties.

An additional and lighter control is also performed by ADENE in the form of random checks on the content of the certificate. In case there is wrong or inconsistent information in the certificate, a detailed quality check can be triggered. But in most cases, this mechanism is used to warn experts

about possible improvements in the quality of the information they put in the certificate, thus assuring a more or less uniform content to all certificated.

At least once every 5 years, each expert will be audited by ADENE to evaluate its correct use of methodologies and tools. About 10% of the certificates will be subjected to this analysis. This control will be financed by the fee paid for registration of each certificate (45€ per certificate in residential buildings and 250€ per certificate in non-residential buildings).

Inspections of boilers and air-conditioners are covered by the HVAC regulations adopted by the Government on 4 April 2006 and it shall become mandatory from 1 January 2009. The procedures for inspection of boilers and air conditioning systems are still under discussion. In the case of non-residential buildings, inspections will be a required part of the HVAC maintenance plan and its execution will be subject to verification by qualified experts when performing periodic audits to the building, once every 2 or 3 years. [SOURCE: ADENE - ASIEPI REPORT – PORTUGAL: IMPACT, COMPLIANCE AND CONTROL OF LEGISLATION]

Transport sector

Biofuels represent an area of diversifi cation in the supply of fuel to the transport sector which has recorded the highest growth rates in terms of energy consumption. In Portugal, the transport sector's energy dependency on oil, which is responsible for 42% of total imported oil consump tion, is very high. The replacement of more than 300 million litres of fuel by 2010, comprising the incorporation of 10% in road fuels, bringing the EU's objective forward by 10 years, promotes the creation of industrial plants and development of energy based agriculture. The government set the quantity of biofuels to be exempt ed from ISP (tax on oil products) at 205 thousand tonnes in 2007. Of this amount, 4 973 tonnes derive from national ag ricultural production. However, this figure should rise to 405 thousand tonnes by 2010 in light of the forecast increase of the incorporation percentage. The fiscal exemptions (ISP) have been designed to promote the use of biofuels in the transport sector, to reduce Portuguese energy dependency and comply with the Community directive establishing the replacement of 10 per cent of conventional fuels used in the transport sector, by alternative fuels by 2020. Small dedicated producers are entitled to total exemption from ISP up to a maximum global amount of 40 thousand tonnes per year.

Industrial energy audits

Until February 2009, 673 intensive energy consuming companies registered online to imposing binding energy audits, been desegregated in 2 universes: companies exclusively covered by this regulation (new records) and the Emission Trading Scheme (ETS) facilities that although free decided to register or companies that passed from the previous regulation and which will gradually fully be integrated in the SGCIE as new records.

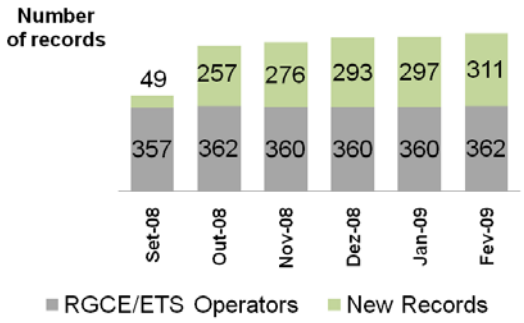


Figure 30 - Evolution of number of records on database

In the universe of registered operators dominates the number of companies with annual energy consumption higher than 1000 toe/year resulting from the number of registered operators still under RGCE.

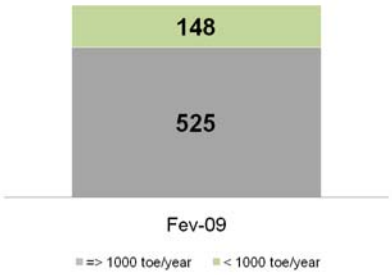


Figure 31 - Operator's desegregation according to final energy consumption

The following graphs show the distribution of new records (311) concerning its geographical distribution and the classification of economic activity (CAE).

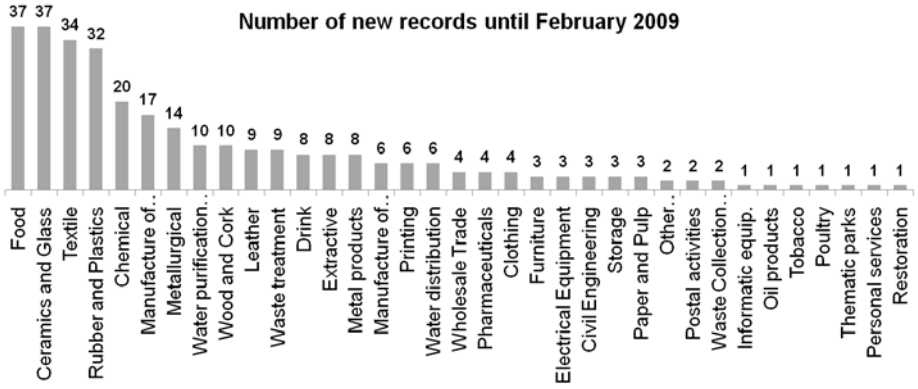


Figure 32 - Classification of economic activity

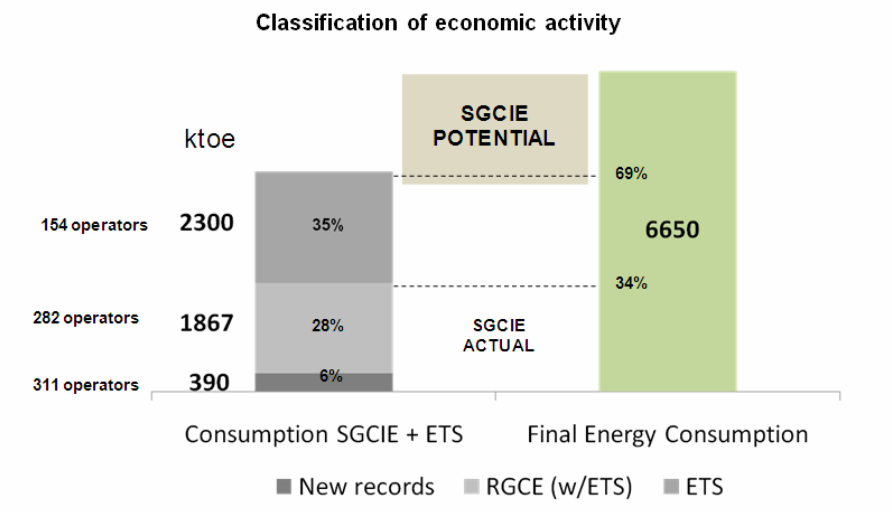


Figure 33 – SGCIE targeted consumptions

The existing records in SGCIE equals 2257 ktoe and represent 34% of final energy consumption in the sectors of Agriculture, Mining, Manufacturing and Building and Construction according the energy balance of 2007.

We note however that the universe of facilities in the SGCIE and those in the EST represent about 70% of total final energy consumption of the referred universe which means that the total number of installations covered by the regulation can be around 1000 facilities.

The following chart represents the breakdown of energy used forms in energy-intensive installations for the new records.

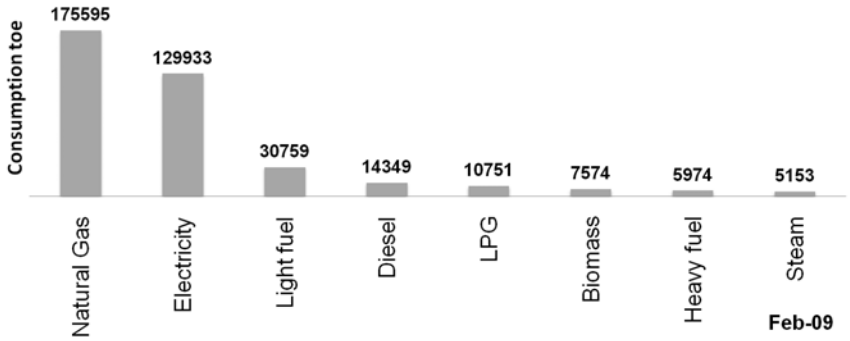
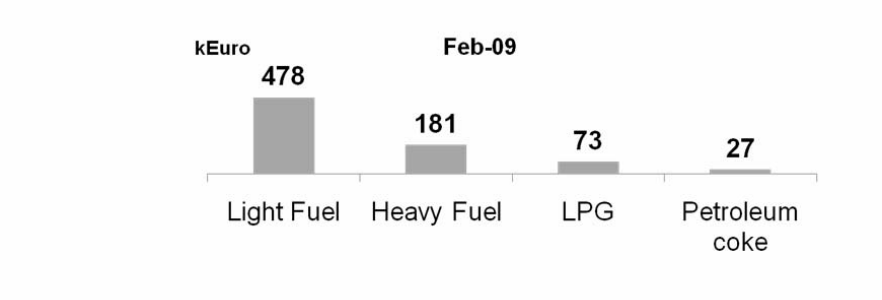


Figure 34 – Energy forms used (new records)

As regards the implementation of fiscal benefits of the SGCIE, the law 1530/2008 of 29 December with effect from 1 March 2009, sets the petrol taxes (ISP) for certain fuels consumed by industrial companies or facilities that are not EST or that don't have an Agreement for the Energy Consumption Rationalization ARCE) under the regulations of the SGCIE.

Energy intensive consumers who have an approved plan for rationalization of energy consumption can obtain exemption from the ISP taxes for the industrial fuels classified within codes 2701, 2702, 2704 and 2713, fuel oil with sulfur content of less than 1% falling within code 2710 19 61, fuel oil with sulfur content of higher than 1% falling within code 2710 19 63 to 2710 19 69 and LPG classified by the code 2711.

The following graph shows the impact of ISP exemption relating to new records.



Number of operators	48	8	88	3
Average (kEuro/year)	9,9	23	0,84	9

Figure 35 - ISP exemption impact (new records)

5 National Developments under the EU Energy Efficiency Directive and the 20% Energy Efficiency Target of the EU

New national measure to be taken under the Energy Efficiency Action Plan:

- The Thermal Solar Programme initially targeted the residential segment but now covers the Private Institutions of Social Solidarity (IPSS) and Public Utility Sports Associations. By September 2009, over 90 of these institutions had already solicited the study leading to the installation of panels under this measure;
- Reform of car tax, to internalise environmental, social infrastructure costs. Measures taken in the SB 2009 that aims to reduce the negative impact of the reform on the tax revenue and give continuity to the progressive reduction in the carbon dioxide emissions;
- The launch of a reference award for the best practices in the area of Energy Efficiency;
- A 2.5% bonus/reduction on electricity tariff for consumers with less energy consumption and an incentive tariff for the least efficient;
- The awarding of an “Efficiency Cheque” for 2 years worth 10% or 20% of annual electricity expenses for consumers making a reduction of 10% or 20%, respectively, for investments in Energy Efficiency;
- The creation of a subsidised line of credit with €250m/year for investments in energy efficiency measures, with a strong emphasis on urban rehabilitation;
- The launch of a programme for the renewal of large electric household equipment e.g. €100 incentive for the substitution of an old refrigerator with a new class A++ one);
- The creation of an accelerated amortisation scheme for investments in energy efficiency at industry and services level;
- The energy certification of all State buildings and the launch of an extensive programme for the optimisation of public lighting;
- The creation of a fleet of “green taxis” with reduced emission levels;
- The development of an innovative traffic management platform for Lisbon and Porto using national technology;

- Grant the Porto refinery with a new conversion unit for heavy crude oil through the associations of thermal cracking units and hydrocracking to obtain diesel with a high environmental quality. The aim is to build two new main units and three auxiliary units in the Porto Refinery by the end of 2010, reconfigure three existing units and one new storage unit;

- Increase the diesel production capacity of the Sines Refinery, by conversion from vacuum heavy diesel and from visbreaking heavy diesel readjusting the production profile to the market needs. Four main units and three auxiliary units will be built at the Sines Refinery, three existing units reconfigured and a new unit for making sulphur pellets and a new storage unit will be built;

- Construction of Units for the Organic Valorisation of Urban Solid Waste. In the ambit of the strategy for diverting biodegradable waste from landfills incorporated in the PERSU II (2007□2016), from the perspective of complying with community targets consigned in the Landfill Directive, the units for the organic valorisation existing in Portugal are expected to increase substantially;

- Hospital Waste Treatment. Construction and exploration of an Integrated Centre of Energy Valorisation, Recycling and Treatment of Hospital, Industry and Animal Waste based on the international best practices of waste treatment with a view to minimising the environmental impact and maximising energy efficiency and generating carbon credits. Launch Oct 2008;

- Construction of units for the energy valorisation of sludge from ETAR and CDR. With a view to resolving the problem of the final destination of sludge and of waste from the various Multi□municipal Systems, two Stations for the Energy valorisation of sludge and fuel derived from waste (in Estarreja) and with EDP (in Barreiro), a project promoted by Águas de Portugal, SGPS, jointly representing a maximum installed capacity of 58.8 MW of electrical energy;

- Optimisation of production lines and processes by applying technical solutions and advanced optimisation methodologies (lean manufacturing, kaizen, TPM, 6-sigma, etc) resulting from the recommendations of the Factory of the Future;

- Development of energy and environmental efficiency in production processes that lead to a reduction in companies' energy bills;

- Measure promoting investment in solutions for the Measure promoting investment in solutions for the improved energy efficiency of 100 public buildings that are intensive energy consumers (hospitals, universities, courts, Public Administration buildings): 8 Ministries proposed 61 buildings for intervention, 22 of which have not yet begun the energy audit phase, 18 are already in the audit phase, 12 are in the audit tender process and 9 have already

conducted the audit. Of these, 5 are already implementing energy efficiency measures, estimated at around €1.3m. Interventions are in the final phase at the University of Aveiro and the University Hospital of Coimbra.

- Investments in "Intelligent meters and networks " InovGrid, aiming to support the installation of intelligent energy measurement systems in around 10% of all domestic electricity consumers;

  The InovGrid is an innovative project in the area of intelligent networks using the latest Portuguese technology and know-how. It involves the installation of equipment and systems in the distribution network and in consumers' homes.

  This project is a Network Operator solution that is expected to result in significant benefits for the various segments in the system, notably the consumers, the network operator, the regulator, dealers and the economy as a whole. It will also strengthen the penetration of the electric vehicle.

  Pre-installation is underway of 500 consumers metres, in 4 geographical areas with a view to validating the technology. In 2010, around 50,000 consumers are expected to be covered by the installation of this equipment.

- Promoting the use of electric vehicles. The aim of this measure is to develop a charging network for an estimated 180,000 electric vehicles in 2020, with an initial network of over 1300 charge points by 2011 (and over 25,000 by 2020):

  22/11/2008 – signing of the Agreement between the Portuguese Government and Aliança Renault-Nissan for the development of a supply network for electrical vehicles in Portugal in2010;

  31/12/2008 – (Law nr 64-A/2008) – SB Law for 2009 – provides incentives for the acquisition of electric vehicles: income tax deductions, 30% of charges with 796 euro limit on expenses incurred and total exemption from car tax;

  20/02/2009 (CMR nr 20/2009) – approval of a Programme for Electric Mobility in Portugal aimed at the use of the electric vehicle;

  17/06/2009 (Law Act nr 13896/2009), setting up of an Office for Electric Mobility in Portugal (GAMEP);

  29/06/2009, signing of a Protocol with 21 Municipalities on the Launch of a National Supply Network for Electric Vehicles. This marks the start of the pilot phase of the Network for Electric Mobility – Mobi-E which is expected to run until 2011;

07/09/2009, (CMR nr 81/2009) – Approval of the new targets and objectives of the Programme for Electric Mobility and the annexed Electric Mobility Model, and the list of the 25 municipalities that signed the cooperation agreement with the Government for the preparation of a municipal plan for electric mobility by the end of 2010. [SOURCE: LISBON STRATEGY AND TECHNOLOGICAL PLAN]

Annex 1

Energy Efficiency Measure Summary by Country

HOUSEHOLD

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR1	Energy Efficiency Programme in Buildings	Completed	Legislative/Informative	Appliances, Hot water, Heating	owner-occupiers, housing associations, building professions, general public, landlords, tenants	2002	2006	Medium
POR2	Solar Hot Water Programme for Portugal	Completed	Information/Education	Hot Water, Heating	building professions, general public, tenants, manufacturers, retailers	2002	2004	Medium
POR3	Building code RCCTE 1990	Completed	Legislative/Normative	Heating	owner-occupiers, housing associations, building professions, landlords, tenants	1991	2006	High
POR5	Boilers Efficiency Directive	Completed	Legislative/Normative	Hot Water, Heating	general public, manufacturers, retailers	1996		High
POR6	Energy Consumption Labelling Ordinance	Completed	Legislative/Informative	Appliances	general public, manufacturers, retailers	1994		Medium

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR7	Regulation on HVAC Systems in Buildings (RSECE),1998	Completed	Legislative/Normative	Hot Water, Heating	owner-occupiers, building professions, landlords, tenants	1998	2006	High
POR8	Energy labelling of buildings (2006)	Ongoing	Legislative/Informative	Hot Water, Heating	housing associations, building professions, general public, landlords	2006		High
POR9	Building code RCCTE 2006	Ongoing	Legislative/Normative	Hot Water, Heating	owner-occupiers, housing associations, building professions, general public, landlords	2006		High
POR10	Regulation on HVAC systems in Buildings (RSECE), 2006	Ongoing	Legislative/Normative	Heating	housing associations, building professions, general public, landlords	2006		High

TRANSPORT

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR1	Energy labelling of vehicles	Ongoing	Information, Legislation	Passengers	Individual passengers, General public, New vehicles, Employers	2001		Low
POR3	Fiscal incentives for old cars scrapping	Completed	Fiscal	Passengers	Individual passengers, General public, Existing vehicles, Local authorities, Employers, Manufacturers, Industry/commerce	2000	2006	Low
POR5	Regulation of the use of natural gas as fuel for vehicles	Ongoing	Legislation	Passengers	Individual passengers, Collective passengers, General public, Existing vehicles, Transport companies, Fleets owners	2001		Low

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR6	Periodic mandatory inspections of passenger vehicles, heavy vehicles and trailers	Ongoing	Legislation	Passengers, Goods	Individual passengers, General public, Existing vehicles, Transport companies, Local authorities, Fleets owners, Industry/commerce	2000		Medium
POR7	Regulation for Energy Management (RGCE)	Ongoing	Legislation	Passengers, Goods	Collective passengers, Transport companies, Local authorities, Fleets owners, Industry/commerce	1991		Low
POR8	MAPE/PRIME – Measure for supporting the use of energy potential and rational use of energy	Completed	Financial	Passengers, Goods	Fleets owners, Infrastructure companies, Local authorities, Manufacturers	2001	2006	Low
POR9	Favourable taxation on less pollutant passengers vehicles	Ongoing	Fiscal	Passengers, Goods	General public, Individual passengers	2006		High

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR10	Excise tax relief for biofuels	Ongoing	Fiscal	Passengers, Goods	Collective passengers, Individual passengers, Existing vehicles, New vehicles, General public, Transport companies	2006		High

INDUSTRY

Energy Efficiency Policies and Measures in [country name] 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR1	Regulation for Energy Management (RGCE)	Ongoing	Legislation	All Sectors	Large enterprises, Energy suppliers, Energy Managers / Account., Prof. Associations	1986		Medium
POR2	MAPE/PRIME – Measure for supporting the use of energy potential and rational use of energy	Ongoing	Financial	All sectors	Central government, Energy agencies, Local authorities	2001	2006	Medium
POR 4	Intensive Energy Consumption Management System (SGCIE)	Ongoing	Fiscal/Tariffs, Information/Education/Training, Legislative/Informative	All Sectors	Large enterprises, Energy suppliers, Energy Managers / Account., Prof. Associations	2008		Medium

TERTIARY

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR1	Regulation for Energy Management (RGCE)	Ongoing	Legislation	Total Sector	Energy managers/Account., Local authorities	1986		Low
POR2	Energy Efficiency Programme in Buidings	Ongoing	Education/Information/Training	Commercial offices, Hotel and catering,Public buildings, Sport and leisure	Building profess., General public, Local authorities, Public estates	2002	2006	Medium
POR3	Building code RCCTE 1990	Completed	Legislation	Education, Health, Public buildings, Commercial offices, Government offices, Hotel and catering, Distribution and warehousing, Sport and leisure	Building profess., Local authorities, researchers	1991	2006	High
POR4	Boilers Efficiency Directive	Ongoing	Legislation	Public buildings, Sport and leisure	General public, Large enterprises, Local authorities	1996		High

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR5	Regulation on HVAC Systems in Buildings (RSECE),1998	Completed	Legislation	Education, Health, Public buildings, Commercial offices, Government offices, Catering services, Communication, Credit and Other services, Retail, Commerce, Sport and leisure, Distribution and warehousing	Building profess., Energy managers/Account., Local authorities, Prof. associations, Researchers, Students	1998	2006	High
POR6	Solar Hot Water Programme for Portugal (IP-AQSpP)	Completed	Education/Information/Training	Education, Health, Public buildings, Government offices, Hotel and catering, Sport and leisure	Energy managers/Account., Energy suppliers, General public, Local authorities, Public estates	2002	2004	Medium

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
POR8	MAPE/PRIME – Measure for supporting the use of energy potential and rational use of energy	Ongoing	Financial	Total sector	Energy managers/Account., Financial institution, General public, Large enterprises	2001	2006	Medium
POR9	Energy labelling of buildings	Ongoing	Legislative/Informative	All sectors	Building profess., Energy managers/Account., General public	2007		High
POR10	Building code RCCTE 2006	Ongoing	Legislative/Normative	Total sector	Building profess., General public, Local authorities, Prof. associations	2006		High
POR11	Regulation on HVAC systems in buildings	Ongoing	Legislative/Normative	Total sector	Building profess., General public, Local authorities, Prof. associations	2006		High

CROSS CUTTING

Measure Code	Measure Title	Status	Measure Type	Starting Year	Ending Year	Semi-quantitative Impact
POR1	National Strategy for Climate Change	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2001		Medium
POR2	Feed-in tariff for renewables	Ongoing	Fiscal Measures/Tariffs	1988		High
POR3	Energy Programme	Completed	Financial Measures	1994	1999	Medium
POR4	E4 Programme- Energy Efficiency and Endogenous Energy	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2001		High
POR5	CHP Law	Ongoing	Legislative/Normative Measures	1995		Medium
POR6	National Energy Strategy	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2005		High