**OFFICE OF THE PRESIDENT OF THE COUNCIL OF MINISTERS**

**Resolution of the Council of Ministers No. 80/2008**

Resolution of the Council of Ministers No. 169, of 24 October 2005, approving the National Energy Strategy, in its energy efficiency guidelines provides for the approval of an energy efficiency action plan.

Directive 2006/32/EC of the European Parliament and of the Council, of 5 April 2006, on energy end-use efficiency and energy services, however, established an obligation for Member States to publish an energy efficiency action plan setting targets of at least 1% energy savings per year up until 2016.

The present Resolution of the Council of Ministers approves the National Energy Efficiency Action Plan – Portugal Efficiency 2015, a document which covers a broad set of programmes and measures considered to be fundamental to Portugal being able to achieve and exceed the objects set by said European Directive.

The National Programme on Climate Change, approved by Resolution of the Council of Ministers No. 104 of 23 August 2006, and the National Energy Strategy approved by Resolution of the Council of Ministers No. 169 of 24 October 2005, already provide for a broad set of energy efficiency measures. The present Plan will bring greater ambition and coherence to energy efficiency policies, covering all sectors and bringing together the various measures that have in the meantime been approved and a broad set of new measures in 12 specific programmes.

Preparation of the Plan involved various sectors of General Government and representatives of various enterprise and associative sectors and was the subject of a public consultation.

Thus:

Under the terms of Article 199 *g*) of the Constitution, the Council of Ministers resolves as follows:
1 – To approve the National Energy Efficiency Action Plan (NEEAP) (2008-2015), also referred to as "Portugal Efficiency 2015" (*Portugal Eficiência 2015*), incorporating the energy efficiency policies and measures to be implemented, which are annexed to the present Resolution and form an integral part hereof.

2 – To establish as a target to be reached by 2015, the implementation of measures to improve energy efficiency by the equivalent of 10% of final energy consumption, under the terms provided for by Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006, on energy end-use efficiency and energy services.

3 – To allocate to the Ministry for the Economy and Innovation responsibility for monitoring the present Plan and its results by means of an annual report to be prepared by

the Directorate General for Energy and Geology, with the help of the Energy Agency – ADENE.

4 – To promote the link between the NEEAP and the National Programme on Climate Change, in order to ensure that the measures provided by each of these instruments are compatible.

5 – To determine that the revenue of the Energy Efficiency Fund to be set up, over and above that which is attributed to it by statute, will also include that resulting from the efficiency or tariff incentive provided for in the present Plan.

Office of the President of the Council of Ministers, 17 April 2008. – The prime Minister, *José Sócrates Carvalho Pinto de Sousa* .

**ANNEX**

**National Energy Efficiency Action Plan – Portugal Efficiency 2015**

Executive Summary

The National Energy Efficiency Action Plan – Portugal Efficiency 2015 (NEEAP), is an action plan that brings together a set of energy efficiency programmes and measures with a time frame extending to the year 2015.

The plan is aimed at managing demand fo r energy, in accordance with the scope of the document providing its framework, Directive 2006/32/EC of the European Parliament and of the Council, of 5 April 2006, on energy end -use efficiency and energy services, and is linked to the National Programme o n Climate Change (NPCC), approved by Resolution of the Council of Ministers No. 119 of 31 July 2004, as revised by R esolution of the Council of Ministers No. 104 of 23 August 2006, and the National Allocation Plan for Emission Allowances (NAP), approved by Resolution of the Council of Ministers No. 1 of 4 January 2008.

Said Directive establishes as a target achieving annual energy savings of 1% by the year 2016, taking as a basis the average final energy consumptions recorded over the five -year period 2001-2005 (approximately 18.347 toe).

The NEEAP covers four specific areas subject to guidelines of a predominantly technological nature: Transport, Residential and Tertiary, Industry and State. In addition it establishes three horizontal action areas – Behaviours, Taxation, Incentives and Finance – which are subject to additional analyses and guidelines.

Each of the areas referred to comprises a set of programmes which incorporate in a coherent manner a vast array of energy efficiency measures, aimed at dema nd for energy.

Technologies

Transport

1. Upgrading of Cars
2. Urban Mobility
3. System of Energy Efficiency in Transport

Residential and tertiary

4. Upgrading of Homes and Offices
5. Building Efficiency System
6. Instant Renewable and Solar Programme

Industry

7. Energy Efficiency in Industry System

State

8. E3 – Energy Efficiency of the State

Behaviours

Behaviours

9. Mais (*More*) Programme
10. Operation E

Taxation

11. Green Taxes

Incentives and Finance

12. Energy Efficiency Fund

Levers Adoption Action Organisation Values

The Transport area groups together three energy efficiency improvement programmes:

*Upgrading of Cars* programme, which brings together various measures relating to improving the energy efficiency of vehicles, in particular the upgrading of equipment and use of more efficient products.

*Urban Mobility* programme, which identifies measures related to the modal and commuter needs for public transport in the major urban and corporate centres.

*System of Energy Efficiency in Transport*, which seeks to quantify the impact on efficient usage of the concept of logistical platforms and motorways of the seas.

The Residential and Tertiary area incorporates three major energy efficiency programmes:

*Home Upgrading Programme*, which defines various measures relating to energy efficiency in lighting, domestic electricals, consumer electronics and rehabilitation of space.

*System of Energy Efficiency in Buildings*, which groups together measures resulting from the process of energy certification of buildings, within a programme that includes various measures for energy efficiency in buildings, specifically insulation, improvements in glazed areas and energy systems.

*Instant Renewables Programme*, which is aimed at increasing the penetration of endogenous energies in the residential and tertiary sectors.

The Industry area is covered by a programme referred to as the *System of Energy Efficiency in Industry*, which includes the substitution of the Energy Consumption Management Regulation (Decree-Law No. 58 of 26 February 1982) by a new regulation known as the Energy Consumption-Intensive Management System (SGCIE) containing a

number of notable horizontal measures in the industrial sector, aimed at four technological groups: electric motors, production of heat and cold, lighting and other efficiency measures for industrial processing.

The State area is grouped together under a programme known as Energy Efficiency of the State, with a set of measures aimed as State-run buildings and transport fleets, public lighting and centralised negotiation of energy in central and local government.

The Behaviours area includes programmes aimed at promoting energy-efficient habits and attitudes in consumers, such as the recommendation of efficient products by means of awareness-raising and publicity campaigns.

The Taxation area takes the form of a set of measures aimed at furthering energy efficiency via the tax system, such as the creation of accelerated depreciation schemes for efficient equipment and the interlinking of the benefits system within the IRS with the Energy Certification System for Buildings and renewable energies.

The Incentives and Finance area takes the form of a set of innovative programmes such as the setting up of the Energy Efficiency Fund, incentives for setting up what are known internationally as Energy Service Companies (ESCO) and encouraging urban rehabilitation and the purchase and upgrading of domestic electrical equipment.

Implementation of the plan will allow energy economies of around 1,792,000 tonnes of oil equivalent (toe) in 2015, which corresponds to an economy of 9.8% over the period of reference of Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006.

The induced saving will allow the target set by the European Union to be exceeded by approximately 20%, with efficiency contributions being made across the various sectors of activity and with the State leading the way in terms of efficiency, with induced economies of around 12%.

The energy efficiencies achieved in the year 2015 will be most felt in annual terms in Transport with 729,000 toe, followed by Manufacturing with 418,000 toe, and then the Residential and Tertiary areas with 330,000 and 150,000 toe, respectively. The State will contribute with annual savings of 48,000 toe and the "Other sectors" heading, which covers non-manufacturing industry, will contribute 119,000 toe.

At the aggregate level, the measures applied to all these sectors will induce a specific saving of electricity in 2015 of 4,777 GWh, equivalent to a reduction of 7% in national electricity consumption.

The application of the energy efficiency programmes defined will result in a rationalisation of final energy consumption, by reducing, on average over the period 2008-2015, the rate of growth in energy billing by approximately 1.1% per annum until

2015 (compared with the average consumption for the period of reference of the Directive).

In terms of energy intensity, the application of the present plan will allow Portugal to move further towards the current European average energy intensity, a movement that began in 2006, which is 120 toe/million euros of Gross Domestic Product (GDP). The objective now being set of increasing efficiency translates into an equivalent reduction of 11 toe/million euros of GDP, an object ive that is achievable in both economic growth scenarios considered (high scenario and low scenario).

The annual sources of public finance will come from the Energy Efficiency Fund and the appropriation of funding via the National Strategic Reference Fram ework (QREN).

Annual resources will be applied in a number of specific areas: Innovation, Industry, Energy Service Companies (ESCO), Efficiency Cheque and Renove+ Plan, Efficiency Loans, State Energy Audits, Communication and Coordination. This applicatio n of resources will have as an economic and financial criterion, a period of eight years (simple payback) as the maximum acceptable period for payback of the investments to be made in implementing the quantitative measures proposed.

Sources of finance
Incentives and application of resources

Lamps tax / DGEG
Efficiency Incentive
QREN
Total

Traffic Management Platform (Innovation)
Industry QREN
ESCOs QREN
Efficiency Cheque / Renove+
Efficiency Loans and Efficiency Contract Insurance
State Audits
Prize, Communication and Coordination

Energy Efficiency Fund

Note: Does not include tax incentives
Source: ADENE/DGEG Analysis

Unit: Millions of euros/annum

**Summary of Programmes and Measures**
**Area: Transport**

**Programme: Upgrading of cars**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Revitalisation of the scrapping of end of life vehicles
T1M1
Reduction in automobile tax when purchasing new small cars.

Green Tax – Review of the system of taxation of private cars
T1M2
Voluntary Manufacturer Agreements (AutoOil). Incorporation of the CO2 emission factor in the calculation of the Vehicle Tax and Road Fund Li cence

57,772 231,056

| | | | |
|---|---|---|---|
| % of small cars in the vehicle fleet aged 10 years or over | 37% | 35% | 30% |
| Average CO2 emissions of new vehicles sold | 143 | 120 | 110 |
| % of vehicles with low emission (< 110 gr/v. Km) in the overall vehicle fleet | - | 3% | 10% |

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Correct tyres and fuel efficiency

T1M3
Penetration of tyres with low rolling resistance. Voluntary agre ement with car makes so that new vehicles in segments A, B and C are fitted as standard with low rolling resistance (RR) tyres.

16,843 27,401

T1M4
Correct pressure. Reduction by half in the number of vehicles in circulation with incorrect tyre pressures

T1M5
Efficiency fluids. Publicity campaigns and certification of fuel efficient lubricants and fuels.

6,079 12,962

New vehicles with greater "awareness" of fuel savings.

T1M6
Voluntary agreements with vehicle importers to include equipment that helps with lowering consumption (on board computers, tyre pressure monitoring systems, etc.).

10,200 26,769

Penetration of efficient tyres in the vehicle fleet (low rolling resistance)

| | | | |
|---|---|---|---|
| Small passenger cars | 15% | 25% | 30% |
| Commercial passenger vehicles | 5% | 10% | 15% |

% of vehicles with incorrect tyre pressures

| | | | |
|---|---|---|---|
| Small passenger cars | 30% | 20% | 15% |

| | | | |
|---|---|---|---|
| Commercial passenger vehicles | 30% | 20% | 15% |
| Heavy vehicles | 20% | 15% | 10% |
| % of sales of efficient lubricants | 10% | 15% | 20% |
| % of vehicle fleet with monitoring systems (onboard computer, cruise control, GPS and tyre pressure monitoring) | n.a. | 8% | 20% |

**Total** **90,894** **298,188**

**Programme: Urban Mobility**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Regional Planning and Urban Mobility in the District Capitals
T2M1
Lisbon Metropolitan Transport Authority
Porto Metropolitan Transport Authority
Mondego Light Railway
Municipal or regional mobility plans

130,428

Plans for urban mobility at office parks and industrial parks
T2M2
Business centres or industrial parks with more than 500 workers must have an integrated mobility plan.

3,832

Improved Efficiency of Public Tr ansport
T2M3
Low emission vehicles

Use of mini-bus fleets at off-peak times in public transport systems.

7,910

Traffic management platform in major urban centres
T2M4
System for Transit Optimisation in Major Cities using the GPS platform

27,668

| | | | |
|---|---|---|---|
| % Modal Shift (cumulative compared with 2005) | | | 5% |
| No. of mobility plans approved | | n.a. | n.a. |
| % of vehicles with low emissions | | 1% | 10% |
| % of minibuses in the public transport fleets | | 5% | 15% |
| % of GPS with transit optimisation | 0% | 0% | 5% |

**Total 169,837**

**Programme: System of Energy Efficiency in Transport**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Portugal Logistics
T3M1
Increased efficiency in the transport of goods, by strengthening intermodality and shifting of goods transported by road to rail and maritime modes. Creation of a national network of 12 multi-mode logistics platforms, 2 air cargo centres and a single logistics window (linking of sea-port-land-platform).

51,730

Motorways of the seas
T3M2
Shift to maritime mode of goods transported by road mode.

51,480 61,089

Change in the offering of CP. Reduction in journey times.
T3M3
Increased use of the railway network.

31,123 33,577

SEET System of Energy Efficiency in Transport
T3M4
RGCE Transportes – voluntary agreements 5% reduction in TOE/GVA

5,858 76,593

| | | | |
|---|---|---|---|
| % of road traffic on logistics platforms (tkm) | 80% | 80% | 75% |
| % of shift of international road transport of goods to maritime mode | | 15% | 20% |
| Absolute demand targets in each of the lines (million pKm) | | | |
| Lisbon - Porto | n.a. | 852 | 943 |
| Lisbon – Algarve | n.a. | 178 | 197 |
| Lisbon – Castelo Branco | n.a. | 70 | 77 |
| Energy intensity of goods transport (TOE/GVA) | 591 | 585 | 550 |

**Total 88,461 222,988**

**Area: Residential and Tertiary**

**Programme: Upgrading of Homes and Offices**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Substitution of the stock of inefficient equipment
R&S4M1
Acquisition of cooling, refrigeration and freezing equipment of classes A++ and A+
13,892 47,536
R&S4M2
Purchase of efficient laundry equipment (class A)
5,320 14,642
R&S4M3
Substitution of lamps. Phasing-out of incandescent lamps.
35,820 75,022

Discouragement of the acquisition of new inefficient equipment
R&S4M4
Tax on inefficient equipment. Restrictions on the marketing of equipment of the lowest classes. Information on whole-life-cycle-cost
537 4,393

Remodelling measures
R&S4M5
*Efficient windows*. Upgrading of glazed areas
1,335 3,735
R&S4M6
*Efficient insulation*. Installation of insulating materials
710 1,987
R&S4M7
*Green heat*. Installation of biomass powered heat exchangers, micro-cogeneration with biomass or heat pumps (COP >= 4)
6,247 16,020
Upgrading of office equipment
R&S4M8
Substitution of office equipment. Accelerated depreciation of efficient equipment, to encourage the substitution of desktops by laptops, A/A+ photocopiers or multifunction systems
6,258 16,280

% of stock efficient (A, A+, A++)

| | | | |
|---|---|---|---|
| Refrigerators | 8% | 18% | 37% |
| Freezers | 1% | 7% | 25% |

| | | | |
|---|---|---|---|
| % of stock of washing machines efficient (class A) | 1% | 10% | 25% |
| % of CFL in the lighting stock | 15% | 39% | 61% |
| % of sales of efficient equipment (class A or above) | 50% | 75% | 90% |

| | | |
|---|---|---|
| Total number of homes | 60,000 | 160,000 |
| m2 installed | 600,000 | 1,600,000 |
| Total number of homes | 30,000 | 80,000 |
| m2 installed | 1,500,000 | 4,000,000 |
| Total number of homes | 7,500 | 20,000 |
| Number of substitutions | 200,000 | 1,500,000 |
| **Total** | **70,119** | **179,613** |

**Programme : System of Energy Efficiency in Buildings**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Residential buildings
R&S5M1
Achievement in new buildings of minimum quotas by efficiency classes
Programmes for remodelling of the stock requiring repairs
34,792 94,436

Service buildings
R&S5M2
Achievement in new buildings of minimum quotas by efficiency classes.
Increased penetration of cogeneration systems. Implementation of solar heating and micro-production in schools
32,561 98,386

| | | |
|---|---|---|
| No. of certificates issued | 170,308 | 475,159 |
| No. of certificates issued | 9,427 | 22,705 |
| **Total** | **67,353** | **192,822** |

**Programme: Instant Renewables**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**
**Sector**

**Impacts (toe)**
**Intermediate scenario**
**2010** **2015**

**Targets**
**Indicators** **Current** **2010** **2015**

Micro-production
R&S6M1
Encouraging micro-production (photovoltaic, wind, hydro, biomass, etc.)

Residential

8,793 23,447

Solar Thermal
R&S6M2
Publicity campaigns.
"Renove – Solar Termico" (*Upgrade – Solar Thermal*) programme. Programme of incentives for installation of new solar thermal.
Mandatory installation of solar thermal in new buildings.
Programmes oriented at specific segments.

Residential

5,446 13,844

Tertiary

| | | | |
|---|---|---|---|
| 4,236 | 12,180 | | |
| Installed power | | 62 | 165 |
| No. installations | | 21,788 | 58,100 |
| Total installed area (m2) | | 417,410 | 1,113,093 |
| | | 102,215 | 272,572 |
| **Total** | **18,475** | **49,471** | |

**Area: Industry**

**Programme: Energy Efficiency in Industry Programme**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010** **2015**

**Targets**

| **Indicators** | **Current** | **2010** | **2015** |
|---|---|---|---|
| Energy Consumption-Intensive Management System | | | |
| I7M1 | | | |
| **Industry-wide measures**: | | | |
| - Electric motors | | | 27,079 |
| - Production of heat and cold | | | 164,429 |
| - Lighting | | | 1,911 |
| - Energy efficiency of the industrial/other processes | | | 155,163 |
| I7M2 | | | |
| **Sector-specific measures:** | | | |
| - Food, drink and tobacco | | | 6,242 |
| - Textiles | | | 2,296 |
| - Pulp and paper | | | 9,588 |
| - Chemicals, plastics and rubber | | | 9,340 |
| - Ceramics | | | 8,728 |
| - Metal working and founding | | | 730 |
| - Glass | | | 3,044 |

| | |
|---|---|
| - Cement | 0 |
| - Clothing, footwear and leather | 79 |
| - Iron and steel | 2,594 |
| - Wood and wooden articles | 527 |
| - Metal, electromechanical | 1,089 |

I7M3
Savings in other sectors of activity (SGCIE) 118,717

I7M4
**Retroactive measures** 24,800

Energy intensity of industry 339 302

% of savings in other sectors of activity 12%

**Total 536,356**

**Area: State**

**Programme: Energy Efficiency of the State**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Buildings

E8M1
Energy certification of State buildings 4,652 16,401

E8M2

Solar thermal – Swimming pools. Installation of solar thermal systems for DHW in pools and changing rooms

E8M3

Solar thermal – Sports premises. Installation of solar thermal systems for DHW.

2,301 6,138

E8M4

Micro-producer schools. Installation of electrical energy micro -production systems in State schools. 605 1,613

E8M5

Hospital cogeneration. Creation of energy production centres at medium - and large-sized hospitals.

0 2,137

Transport

E8M6

Phasing-out of vehicles with CO2 emissions higher than a stated limit. State car fleet to have 20% low emission vehicles by 2015. Acquisition of vehicles subject to existing vehicle short list. Mobility plan for organisations with more than 500 workers in the same location.

676 1,765

Green Procurement

E8M7

Introduction of energy efficiency criteria into the acquisition of equipment. Qualification of enterprises in competitions limited to entities with approved energy efficiency improvement plans. Procurement of new buildings for the State limited to buildings classed as efficient.

1108

Efficient public lighting

E8M8

Installation of flow regulators to guarantee improved energy efficiency in public lighting.

1,764 6,174

E8M9

Substitution of globes by equipment with a greater reflection capacity and requirement for lower power lamps

230 805

E8M10

Meeting of minimum energy efficiency requirements for new installations

893 3,126

E8M11

Phasing out of mercury vapour lamps from public lighting

| | | | |
|---|---|---|---|
| | | 814 | 3,258 |
| E8M12<br>Substitution of lights and electronic ballast older than 10 years | | 2,003 | 5,340 |
| E8M13<br>Traffic control systems, substitution of light sources in traffic and pedestrian control systems (LED technology) | | 60 | 1,507 |
| Percentage of buildings with improved energy classification | | 9% | 30% |
| No. of installations in swimming pools | | 107 | 285 |
| No. of installations in sports premises | | 266 | 710 |
| No. of systems installed | | 938 | 2500 |
| Installed power (MW) | | 5.6 | 15 |
| No. of hospitals with cogeneration | | | 22 |
| Reduction in consumption | | | 10% |
| % of the stock of equipment with improved efficiency | | | 10% |
| No. of lighting outlets subject to intervention | | 46,429 | 162,500 |
| No. of globes substituted | | 14,286 | 50,000 |
| No. of new installations | | 57,143 | 200,000 |
| No. of mercury lamps installed | 300,000 | 225,000 | 0 |
| Total number of lighting outlets | | 40,385 | 107,692 |
| No. of traffic lights with LEDs | 100 | 1,000 | 25,000 |
| **Total** | **13,999** | **49,371** | |

**Area: Behaviours**

**Programme: Operation E**

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Programme**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2015**

Operation E

Energy in schools
C10M1
Monitoring of energy consumption and publication of results ( "energometers"). Conducting of information and awareness -raising campaigns among students and teachers. Energy "Open week". Green campus. Renewable energy in schools

Energy in transport
C10M2
Eco-driving. "Eco-driving" content in driving schools. Campaign of tips for more efficient driving.
35,956

Energy in the home.
C10M3
Information and awareness-raising campaigns on energy topics. Energy efficiency portal. Network of information points.
35,142

Energy at work
C10M4
Information and awareness-raising campaigns on energy topics: lighting, heating of areas, etc.
22,734

'15th salary campaign'
C10M5
Information on the sums it is possible to save each year

**93,832**

## 1 - Framework

In the last two years, and for the first time since the start of the 1990s, there has been a recorded decrease in final energy consumption. The reduction was particularly notable in 2006, which saw an annual rate of change of one percentage point compared with the previous year. In 2007, final energy consumption remained at the levels of the previous year.

### 1.1 Change in Final Energy Consumption

Since the start of the 1990s, final energy consumption has grown by an average of 3.2% per annum, some seven tenths above the average rate of growth of the Gross Domestic Product ([1]) recorded in the period.

Since 1990 energy growth has had two profiles, one fairly steep, recorded in particular in the second half of the 1990s, and the present profile with lower rates of change, which have been in evidence in particular since 2001.

Annual growth in energy consumption since 1990 has been systematically greater than annual growth in GDP, with two exceptions: the two-year period 1994-1995 and more recently since 2005.

In terms of the distribution of consumption by sector, it can be seen that the Industry, Transport and the aggregate of the Residential and Tertiary sectors are equivalent in terms of quantity of energy consumed.

Energy growth has been driven by the Tertiary and Transport sectors, with fairly clear growth in consumption in the 1990s of more than 5% per annum. The Tertiary sector in particular, in the second half of that decade, recorded double-digit average annual growth rates (10.8%).

In the current decade it can be seen that the Tertiary sector is continuing to maintain a strong upward trend, growing up until 2005 at an annual rate of 6.8%. The Transport sector has seen its growth trend checked at slightly lower than one percentage point (annual average of 0.7%).

The Domestic and Industrial sectors, with generally lower average growth, have driven overall average values lower.

The Residential or Domestic sector, recorded a fairly marked growth rate in the second half of the 1990s of 2.8%, almost three times the rate of growth in the first part of the decade.

In the current decade the Industry sector is experiencing a reduction in the rate of growth, the complete opposite of the position at the end of the nineties which saw growth in excess of four percentage points per annum being recorded.

### 1.2 – Variation in energy intensity

Energy intensity, which is the indicator par excellence of the energy efficiency of the economy, as it allows economic development and the energy consumptions behind this to be positioned in the same continuum, enables a number of improvements in performance in recent years to be highlighted. It is important that these are consolidated and accelerated.

Energy intensity of Portugal and the European average

Final energy / GDP
(Tonnes of Oil Equivalent per million euros of GDP)

Portugal
EU-27 average
Deviation

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

Energy intensity in Portugal in 1997 was 138 toe per million euros of GDP, that is to say that, in order to generate one million euros of GDP, it was necessary to incorporate 11 tonnes of oil equivalent more than the average of our European partners.

Energy intensity grew up until 2005 to 148 units, while in Europe this indicator improved substantially during the same period from an already optimised 127 to 120 toe/million GDP, thereby almost doubling the existing deviation.

The years 2006-2007 saw the first reduction in this indicator for a very long time, allowing a clear convergence with Europe, which will without doubt have to be consolidated and accelerated in the coming years in order to reduce and cancel out this differential which, ultimately, translates into lower productivity and economic competitiveness.

In assessing the impact of the measures contained in the NEEAP, rates of growth of GDP are assumed to be 4.27% in the high scenario and 2.90% in the low scenario with an intermediate value having been adopted for the purposes of calculation of 3.6%, which is the arithmetic mean of the two scenarios.

## 1.3 – Growth in consumption scenario

Projections of energy consumption allow it to be concluded that in a scenario of business as usual in 2015 we will be consuming between 21.5 and 22.4 thousand million toe of final energy, the spread being explained by an annual variation in average growth, after 2010 of 2.1% in a high scenario of GDP growth, and 1.2% in a low scenario.

Should energy efficiency me asures not be implemented, it is estimated that consumption will increase at a rate in excess of that recorded in the last 5 years. Using the energy intensity as a reference, under these scenarios Portugal would take around 15 years to converge with the current European average, assuming that the latter remained constant in the coming years, something that is certain not to happen, given the high investment that can be expected in energy competitiveness and productivity in the various European economies, particularly with reference to the central and eastern European countr ies that have recently joined the European Union.

So, despite the expected trend towards improvement in energy intensity this will not be sufficient to meet the stated target of 120 toe/million euros of GDP. In effect, in a scenario of high growth in GDP, intensity can be expected to experience a reduction of approximately 13% in the period 2005 -2015, reaching a value of 129 toe. In a scenario of low growth in GDP, this reduction would be 11%, giving 132 toe per million euros of GDP.

Forecast change in en ergy intensity in Portugal for a business as usual scenario assuming a high rate of growth in GDP

(toe per million euros at 2000 prices)

EU-27 average (2005)
Trend([1])

Forecast change in energy intensity in Portugal for a business as usual scenario assum ing a low rate of growth in GDP

(toe per million euros at 2000 prices)

(1) With the implementation of energy efficiency measures
Note: preliminary figures
Source: Energy Balances (DGEG); CEEETA; ADENE/DGEG analysis

## 1.4 Programmes and measures

The energy efici ency measures provided for in the present plan will be grouped into 12 main programmes, each of which will have a set of measures which are linked together or

have clear shared objectives, particularly with regard to interlinking with the PNAC from where a number of measures originate.

Of the later measures, an attempt will be made to integrate into the present plan only the energy efficiency component from the demand point of view, in conjunction and in harmony with the objectives defined in the PNAC 2006 , without considering in this case their possible impact at the energy supply level.

The programmes thus contain around one hundred measures, grouped by area or sector, and fully in keeping with Directive 2006/32/EC, namely Transport, Residential and Tertiary, Industry and State.

Three areas of a horizontal nature are also being created aimed at multi -disciplinary integration. In this situation these are the areas of Social Behaviours, Taxation and finally Incentives and Finance.

## 2 – Transport

The transport area is responsible for more than one third of final energy consumption, and in 2005 consumption by passenger and goods transport activities was more than 6.8 million toe, with an average annual growth rate since 1990 of 4.5%.

Energy growth in this area reached its maximum exponent in the 1990s, recording average growth in the first half of that decade of more than 5% and in the second half of more than 7% per annum. Since the start of the current decade the rate of growth has been 0.7% per annum.

The preferred transport medium has without doubt been road, with a share of some 90%, and high rates of growth in the last 15 years that are directly correlated to the strong growth in the vehicle fleet recorded in the period.

Another sub-sector with strong increases in consumption is air, where at the end of the second half of the 1990s, average annual growth rates in excess of 6% were being recorded.

The maritime and rail sub-sectors recorded slight decreases or increases save for rare exceptions. This is evidenced by the fact that in the last ten years rail transport has been experiencing a constant year on year fall in consumption, which has been particularly felt in the last 5 years with an annual reduction of 3.5%.

The exception to this rule is mariti me transport which since the start of the decade has posted growth in excess of 10%.

There are three main programmes in this area. The first of these promotes energy efficiency in private transport, Upgrading of Cars, another, Urban Mobility, promotes the use of public transport, and finally the System of Energy Efficiency in Transport is a

programme to regulate the transport system. Various specific measures are grouped together under these programmes.

### 2.1 Renove Carro (*Upgrading of Cars*) Programme

This programme is comprised of four main measures for improvement in the private transport segment, encouraging upgrading and more efficient usage.

Objective
**To increase energy efficiency in transport through upgrading of equipment and stimulating the acquisition of energy efficient vehicles and products**

Revitalisation of the scrapping of end of life vehicles
Reduction in car tax on the purchase of new small cars
. Review and simplification of the scheme for granting the incentive
New car taxation system
. Substitution of ISV (Vehicle Tax) by IUC (new and attractive)
. Environmental component in the IUC (penalising inefficient vehicles)
Revitalisation of the programme of scrapping end of life vehicles
. Increased efficiency in the coverage and incidence of the IUC

. Reducing the proportion of small vehicles of more than 10 years old from 37% to:
- √ 35% in 2010
- √ 30% in 2015

**Green Tax – Review of the system of taxation of private cars ([1])**
Incorporation of the CO2 emission factor in the calculation of the ISV and IUC
. Applied to new vehicles
. Applied to used vehicles imported from other Member States
Hybrid vehicles with a reduction of 50% in ISV

. Average emissions of new cars
- √ 120 g/km in 2010
- √ 110 g/km in 2015

**Correct tyres and fuel efficiency**

Correct tyres campaign
. Encouraging periodic checks for correct pressure
. Voluntary agreements for vehicles to be fitted with efficient tyres as standard ([2])

Increased use of fuel efficient additives and lubricants
. Publicity campaigns
. Product labelling

. Increase of 2% in penetration of efficient tyres

. Reduction of 1% per annum in the level of tyres with incorrect pressure
. Increase of 1% per annum in the share of efficient additives and lubricants

**New vehicles with greater "awareness" of fuel savings**

Voluntary agreements with car importers to include as standard equipment that brings about efficiency in consumption
. Onboard computer
. GPS
. Cruise control
. Automatic tyre pressure monitoring systems

. % of car stock with monitoring equipment
- √ 2% in 2010
- √ 20% in 2015

(1) Revitalisation of measure provided for in the PNAC
(2) Initiative dependent upon the creation of an energy classification of tyres at the European level, with the exception of activities aimed at checking tyre pressures

**2.1.1 – Measure to revitalise the programme of scrapping of end of life vehicles**
**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Revitalisation of the scrapping of end of life vehicles
T1M1
Reduction in automobile tax when purchasing new small cars.

Green Tax – Review of the system of taxation of private cars
T1M2
Voluntary Manufacturer Agreements (AutoOil). Incorporation of the CO2 emission factor in the calculation of the Vehicle Tax and Road Fund Licence

57,772 231,056

| | | | |
|---|---|---|---|
| % of small cars in the vehicle fleet aged 10 years or over | 37% | 35% | 30% |
| Average CO2 emissions of new vehicles sold | 143 | 120 | 110 |
| % of vehicles with low emission s (< 110 gr/v. Km) in the overall vehicle fleet | - | 3% | 10% |

PNAC 2006 Measure

a) Description

This measure provides for the following areas of intervention:
. Reduction in Vehicle Tax (ISV) on the purchase of new small cars:

- Maintain the current incentive.

New taxation of cars:

. Partial substitution of ISV by Road Fund Licence (IUC), making new cars more attractive;

- Environmental component in IUC penalising inefficient vehicles.

. Revitalisation of the programme of scrapping of end of life vehicles, setting more ambitious targets to be reached:

- Increased efficiency in the coverage and incidence of the IUC.

b) Objective

The objective of the measure is to achieve by 2015 a stock of small cars in circulation with an age in excess of 10 years which corresp onds to 30% of the total.

At present the average age is 8.4 years, in the case of small passenger vehicles, and in the small commercial vehicles segment the figure is 7.1 years. These averages are heavily influenced by the fact that the stock of small veh icles aged 10 years or over accounts for more than 1/3 of the total, in the case of small passenger cars, and 1/4 of the total in the case of small commercial vehicles.

c) Impact

The desired results are quantified by the potential savings under the Green Tax – Review of the system of taxation of private cars measure and take as a basis the information on the current car stock available from the Portuguese Automobile Trade Association (ACAP).

### 2.1.2 Green Tax – Review of the system of taxation of private c ars (PNAC 2006 Measure)

a) Description

This measure, originating from the PNAC 2006, aims to create the conditions to allow:

. Implementation of instruments and mechanisms that bring about penetration of low $CO_2$ emission vehicles. Some of the instruments used to further this measure are linked to the reform of the taxation of cars, as well as with the provision of consumer guides and the publishing of energy information on new vehicles.

. Change in the demand for vehicles that are less polluting and more efficient in energy terms, through incorporation of the $CO_2$ emission factor of vehicles in the calculation of ISV and IUC.

. Hybrid vehicles with a reduction of 50% in ISV.

b) Objective

The objective of this measure is an average reduction in the $CO_2$ emission factor of new vehicles sold to the following levels:

2010: 120 g $CO_2$/vkm (PNAC 06)
2015: 110 g $CO_2$/vkm

c) Impact

The assumptions made in the quantification of the energy saving associated with the implementation of this measure are those used as a basis for constructing the reference scenario of the PNAC 2006, specifically in respect of the composition of the national car stock, number of new vehicles sold, level of scrapping and average annual kilometres travelled.

Also included was the estimat ed reduction in the proportion of vehicles aged 10 years or more in the stock, assuming that cars that are older than 10 years travel half the km of others and consume 20% more. It is assumed that when exchanging a car for a newer one the km driven remain constant.

In order to calculate the energy saving associated with the penetration in the national stock of vehicles with a lower carbon intensity (g$CO_2$/km), the behaviour of the new vehicles market was estimated in the absence of the voluntary agreement r eached with the car industry.

The energy saving was calculate d from the difference between the consumption factors (corresponding to the estimated emission factors), multiplied by the number of vehicles

sold throughout the period 2008-2015 and the (cumulative) kilometres travelled by each of them.

Assumptions:

. Average annual kilometres travelled by each vehicle of 10,500 (9,000 km/annum for petrol cars; 17,500 km for diesel cars).
. A stock of substituted (more efficient) vehicles of approximately 200, 000 vehicles per annum.

. A reduction in the emission factor of 12 $gCO_2$/vkm, for vehicles sold (200,000) from 2008 onwards (approximately 0.5 l/100 vkm).

This measure is expected to have an impact in terms of energy consumption avoided of 57.7 ktoe in 2010, and 231 ktoe in 2015 (including the revitalisation of the scrapping of end of life vehicles).

### 2.1.3 Correct tyres and fuel efficiency

This measure comprises three sub-measures: Low Rolling Resistance Tyres, Correct Pressure and Efficient Fluids.

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Correct tyres and fuel efficiency

T1M3
Penetration of tyres with low rolling resistance. Voluntary agreement with car makes so that new vehicles in segments A, B and C are fitted with low rolling resistance (RR) tyres as standard.

16,843 27,401

T1M4

Correct pressure. Reduction by half in the number of vehicles in circulation with incorrect tyre pressures

T1M5
Efficiency fluids. Publicity campaigns and certification of fuel efficient lubricants and fuels.

6,079 12,962

| | | | |
|---|---|---|---|
| Penetration of efficient tyres in the vehicle fleet (low rolling resistance) | | | |
| Small passenger cars | 15% | 25% | 30% |
| Commercial passenger vehicles | 5% | 10% | 15% |
| | | | |
| % of vehicles with incorrect tyre pressures | | | |
| Small passenger cars | 30% | 20% | 15% |
| Commercial passenger vehicles | 30% | 20% | 15% |
| Heavy vehicles | 20% | 15% | 10% |
| | | | |
| % of sales of efficient lubricants | 10% | 15% | 20% |

### 2.1.3.1 – Low Rolling Resistance Tyres Measure

a) Description
. Voluntary agreement so that vehicles start to come with efficient tyres as standard.

b) Objective
The objective is to double by 2015 the penetration of energy efficient , low rolling resistance (RR) tyres, taking as basis the existing information and technical definitions which are liable to be forthcoming at European level in the future.

The intention is to move from the current levels of 15% and 5%, which come, respectively, from the stock of light passenger vehicles and goods vehicles, to exactly double the figure in the case of the first, and three times in the case of the second segment. The economies associated with these measures will provide an average saving in consumption of vehicles of between 1% and 2%.

An efficient tyre can have half the r olling resistance (RR) coefficient of an inefficient one, with a variation in RR of a small vehicle of between 0.014 (least efficient) and of 0.007 (most efficient). Heavy veh icles have lower average variations, with their RR ranging from 0.085 (least efficient) to 0.055 (most efficient).

The penetration of the tyres referred to will be inversely proportional to the engine size of the vehicles, since the higher levels of penet ration stem from vehicles in low and medium-low segments, also referred to as classes B and C. This objective has an essentially technical nature, since the lower engine sizes in these segments, along with

the lower top speeds, allow higher road safety pe rformance indices to be achieved when the vehicles are used at maximum performance.

Thus it is expected that 75% of low RR tyres are sold in the said two segments. The economy class, or class A, is estimated with a possible penetration of 15%, which is certainly determined by the fact that the higher cost of investment may put off some users. Among consumers in classes D and E the penetration will be marginal, since the low RR index is a determining factor in driving at high speeds.
The objective of doubling penetration will allow a shift from 0.7 million tyres with low RR sold in 2005, to around 1.7 million in 2015.

c) Impact

This measure will lead to avoidance of energy consumption of the order of 5.8 ktoe in 2010 and 9.4 ktoe in 2015.

### 2.1.3.2 – Correct Pressure Measure

a) Description

. Awareness-raising campaigns concerning the correct pressure and balancing of tyres.
. Encouraging periodic checks for correct tyre pressures

b) Objective

The objective of the measure is to reduce by 15% the stock of vehicles in circulation with incorrect tyre pressures.

It is estimated that more than 1/5 of vehicle s in circulation have tyre pressures that are incorrect by between 0.4 and 0.5 Bar. The increase in consumption caused by this fact ranges from 1% to 2.5%.

c) Impact

The matrix of calculation factors allows a saving associated with the measure of 18 ktoe to be identified in 2015, taking as a basis the following assumptions.

The basis of incidence (BI) will be the consumption assigned to the types of vehic les where the measure has an impact, that is to say the 5.4 million small vehicles and the 153,000 heavy vehicles. The potential of the measure (PMM) will be equivalent to a 2% reduction in light and 1% in heavy vehicles.

As there are no technical limitat ions on the measure, the InS (Implementation in the Sector) will be equivalent to 15% of aware drivers in the small vehicles segment and 10% in the heavy vehicles segment. Consumptions of energy avoided by the implementation of this measure are of the orde r of 11 ktoe in 2010 and 18 ktoe in 2015.

### 2.1.3.3 – Efficient Fluids

a) Description

Increase in the use of efficient fluids, namely fuel economy additives in fuels and low viscosity lubricants, products which by their technical requirements contribute t o increased energy efficiency in the engines of motor vehicles.

b) Objective

The aim is to reach a level of efficient fluids in 2015 that is equivalent to 1/5 of the total products sold in the market, which involves doubling the levels of these products in the car market.

c) Impact

The quantification of the savings takes as a basis an analysis of the levels of efficient fluids currently existing in the market. Low viscosity lubricants serve as a reference. These allow better performance by vehicle engin es, in particular by reducing wear in the mechanical components of the vehicle.

The market share of these products is approximately 10% ( [2]). It is estimated that pursuing a set of measures aimed at publicity and encouragement by means of voluntary agreements with manufacturers and importers will allow a doubling of the current figure.

The energy consumption avoided as a result of the application of this measure will be 6 ktoe in 2010 and 13 ktoe in 2015.

### 2.1.4 – New vehicles with greater "awareness" of fuel savings.

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

New vehicles with greater “awareness” of fuel savings

T1M6
Voluntary agreements with vehicle importers to include equipment that helps with lowering consumption (onboard computers, tyre pressure monitoring systems, etc.).

10,200 26,769

% of vehicle fleet with monitoring systems (onboard computer, cruise control, GPS and tyre pressure monitoring) n.a. 8% 20%

a) Description

The measure aims, via a set of voluntary agreements with motor car manufacturers and importers, to ensure that their passenger and commercial ranges include as standard equipment that encourages efficiency, with the value of this equipment being excluded from the car taxation base with a cumulative limit to be established by legislation.

The set of equipment contributing directly to energy efficiency is:

. Onboard computers.
. GPS.
. Cruise control.
. Automatic tyre pressure monitoring systems.

b) Objective

The objective is to achieve by 2015 a penetration of voluntary agreements corresponding to 20% of annual sales of new vehicles.

c) Impact

An estimate has been made o f the expected energy economies for 2015 assuming a 2% reduction in consumption of energy by small passenger and commercial vehicles, with a market penetration of 20%. This measure has an impact on energy consumption avoided in 2010 of 10 ktoe and in 2015 of 27 ktoe.

## 2.2 Urban Mobility Programme

The objective of the programme is to encourage the use of public transport rather than private transport, focusing essentially on urban districts , and influencing four specific areas:

. Modal shift in cities.
. Mobility plans that cover designated office parks and industrial areas.

. Boosting measures that encourage improvements in efficiency in public transport.
. Creating an innovative traffic management platform.

The programme can be summarised in the followi ng programme reference table:

Objective
To stimulate the use of means of transport that are more energy efficient such as public transport rather than private transport for commuter travel, whilst at the same time continually increasing, where possible, t he energy efficiency of the former.

Regional Development and Urban Mobility in the District Capitals
Urban Mobility plans for district capitals
Expansion of the Lisbon metro ([1])
Construction of the Tejo Metro Sul ([1])
Construction of the Porto Metro ([1])
Mondego Light Railway ([1])
Lisbon and Porto Metropolitan Transport Authorities ([1])

. Modal shift of 5% of pkm([2]) from private transport to public transport in the MTAs of Lisbon and Porto

Plans for urban mobility at office parks and industrial parks

Business centres or industrial parks with more than 500 workers must have an integrated mobility plan:

. Shuttle/minibus service with modal connection points
. Banking services
. Restaurant services
. Office supplies and/or postal services

. 50% of basic needs covered within walking distance (less than 15 minutes)
. Mobility plans

Improved Efficiency of Public Transport

Increase in proportion of vehicles with emissions of < 110 g/km in taxi fleets

. Efficiency Loans available for upgrading of taxis to “gre en taxis”

Introduction of a Fleet Management System for coaches in the major urban centres

. Performance indicators by driver
. Eco-driving training

. Fleet management system in Lisbon and Porto by 2010

Traffic management platform in major urban centr es

Creation of an innovative traffic management platform for public transport

. Provision of GPS for taxis with transmission of information on speed and location
. Development of an information system
. New GPS equipment with route optimisation data rece ption
. Integration with traffic signalling

Boosting of national consortium and support for project

. Pilot operational in 2010
. System implemented in Lisbon and Porto by 2015

(1) Measure envisaged within the context of the PNAC 2006
(2) pkm = passenger kilome tres

### 2.2.1 - Regional Development and Urban Mobility in the District Capitals

Measures from the PNAC 2006 aimed at modal shift from private transport to public transport in the Metropolitan Areas of Lisbon and Porto and the Mondego Light Railway.

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Regional Development and Urban Mobility in the District Capitals
T2M1
Lisbon Metropolitan Transport Authority
Porto Metropolitan Transport Authority
Mondego Light Railway

Municipal or regional mobility plans

130,428

% Modal Shift (cumulative compared with 2005) 5%

a) Description

. Creation and expansion of metro systems, specifically in Lisbon, Sul do Tejo, Porto and Mondego.
. Development and implementation of mechanisms within the context of the setting up of the Lisbon and Porto Metropolitan Transport Authorities, which encourage a modal shift from private transport to public transport in the Lisbon and Porto Metropolitan Areas.

b) Objective

. Modal shift of 5% of pkm in the Metropolitan Areas of Lisbon (AML) and Porto (AMP), from private transport to public transport in 2015.
. Modal shift to the MLM in 2011: 51,564,663 km and similar increase for the Lisbon and Porto AMs for 2015.

c) Impact

In order to calculate the energy savings associated with setting up the Lisbon and Porto Metropolitan Transport Authorities, the demand was estimated for each of the regions. On the basis of this estimate (overall volume of passenger mobility in the metropolitan areas) modal shift scenario was assumed that allows a reduction of 5% in passenger/km for private transport (PT).

The energy saving results from balancing the energy intensity of each of the modes of transport. The assumptions made in quantifying the energy saving associated with the implementation of the Mondego Light Railway (MLM) measure were used as a basis for constructing the Reference Scenario for the PNAC 2006.

In overall terms, total consumption of energy avoided as a result of the implementation of these measures will be 130 ktoe in 2015.

### 2.2.2 – Plans for Urban Mobility at Office Parks and Industrial Parks

**National Energy Efficiency Action Plan**

**Programmes and Measures**

**Name of measure**

**Measure code**

**Description**

**Impacts (toe)**
**Intermediate scenario**
**2015**

**Targets**
**Indicators Current 2010 2015**

Plans for urban mobility at office parks and industrial parks
T2M2
Business centres or industrial parks with more than 500 workers must have an integrated mobility plan.

3,832

No. of mobility plans approved n.a. n.a.

a) Description

Business centres or industrial parks with more than 500 workers must have a mobility plan that integrates:

- A shuttle/mini-bus service or other services that meet local needs, with modal connection points.
- Banking services.
- Restaurant services.
- Stationery and/or mail services.

b) Objective

- 50% of basic needs covered within walking distance (less than 15 minutes).
- Establish regulations, in coordination with the IMTT and the municipalities, within their respective powers, and define objectives for approval of Mobility Plans up until 2015, which must take into account the current and future public transport plans.

c) Impact

The assumptions made for this measures for 2010, take into account the potential number of vehicles covered (1%) and the expected economy in energy of 0.5%. An increase in the impact of the measure of 1% per annum is assumed to 2015.

The energy consumption avoided is expected to be 3.18 ktoe in 2015.

### 2.2.3 - Improved Efficiency of Public Transport

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Improved Efficiency of Public Transport
T2M3
Low emission vehicles
Use of mini-bus fleets at off-peak times in public transport systems.

666 7,910

% vehicles with low emissions 1% 10%

% minibuses in the public transport fleets 5% 15%

a) Description

Increase in proportion of vehicles with $CO_2$ emissions of less than 110 g/km in taxi fleets.

. Efficiency Loans available to encourage the creation of green taxi fleets, understood to be fleets of vehicles with $CO_2$ emissions of less than 110 grams per Km.

Encouraging the use of minibus fleets in off-peak times in urban public transport systems.

b) Objective

This measure aims to achieve the following objectives:

. 10% of vehicles with low $CO_2$ emissions (110g $CO_2$/km) in 2015.
. 15% of minibus vehicles in fleets in 2015.
. Fleet management system in Lisbon and Porto by 2010.

c) Impact

The assumptions made for the quantification of the impact of these measures took into account the estimated consumption for low emis sion vehicles, the economy induced by the measure and the expected penetration of this type of vehicle.

So, the substitution of around 1,500 low efficiency vehicles in a fleet of ageing taxis and with very high emissions of $CO_2$ by efficient vehicles with a saving of 1.5 l of fuel per 100 km travelled was assumed. The low emission vehicles would lead to a consumption of energy avoided of 0.4 ktoe and 3.9 ktoe in 2010 and 2015, respectively.

The assumptions made for quantification of the impact of the fleet s of minibuses in off-peak times took into account the uses of minibuses in periods of less use of this type of transport. The underlying economies in us ing minibuses rather than coaches are impressive and can reach 30 litres per 100 km travelled. An annua l penetration was also assumed of 75 minibus vehicles in the transport fleets.

The energy consumption avoided will be equivalent to 0.3 ktoe in 2010 and 4 ktoe in 2015.

### 2.2.4 - Traffic management platform in major urban centres

**National Energy Efficien cy Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Traffic management platform in major urban centres
T2M4
System for Transit Optimisat ion in Major Cities using the GPS platform

27,668

% GPS with transit optimisation 0% 0% 5%

a) Description

Creation of an innovative traffic management platform in the major urban centres:

. Provision of GPS for taxis with transmission of information on speed and location.
. Development of an information system.
. New GPS equipment with route optimisation data reception .
. Integration with traffic signalling .
. Boosting of national consortium and support for project

b) Objective

. Pilot project operational in 2010.
. System implemented in Lisbon and Porto by 2015 .

c) Impact

The assumptions made for this measure took as a basis of incidence the consumptions anticipated for private road transport, with a basis of allocation of 30% of the activity and allowing for a saving of 10%. In the calculation of the potential the impacts already provided for in other measures impacting upon private road transport were deducted.

Consumption of energy avoided is of the order of 27.7 ktoe in 2015.

### 2.3 - System of Energy Efficiency in Transport Programme

This measure comprises 3 sub-measures of the PNAC 2006 with Portugal Logistics, Motorways of the Seas, Change in the Offering of CP, plus the SEET – System of Energy Efficiency in Transport.

Objective

Reducing the consumption of energy in passenger and goods transport by shifting to more energy efficient transport systems and introducing efficiency improvement measures in road transport

Portugal Logistics ([1])

Increased efficiency in the logistics and transport chains through strengthening of inter-modality

. Creation of a National Network of Multi-mode Logistics Platforms and air cargo centres
. Creation of a single window to support the linking of the logistics chain with the components of the sea-port-land logistics platform

. Reduction of 5% by 2015 in the proportion of road transport in the logistics platforms.

Motorways of the Seas ([1])

Shift to maritime mode of goods transported by road mode

. Integration of the National Maritime-Port System into the Motorways of the Seas, by means of the Atlantic and Mediterranean corridors

. Development of a single port window between the main ports and customs houses

. Shift of 20% of international road transport of goods to the maritime mode

Change in the offering of CP ([1])
Upgrading of rolling stock

. Increase in capacity

Introduction of new timetables/frequencies of service

Offering of new links/services

**Increase in the use of the rail network**

**. Demand for the lines as a whole of 1,218 million pKm (2015)**

SEET – System of Energy Efficiency in Transport

Creation of a licensing system for the transport of goods

. Mandatory average age of fleet of less than 10 years

Review of the Energy Consumption in Transport Management Regulation

. With plans to improve energy intensity (toe/gva)
. Tax or licensing incentives to comply

Boosting of measures and monitoring of approval of plans

. Upgrading of fleets
. Catalytic Reduction Systems (CRS) and fuel economy lubricants
. Fleet/route management systems and eco -driving training/control
. Rail/sea traffic optimisation.

. Reduction of 5% in energy intensity
. Reduction of 10% in the stock of vehicles older than 15 years

### 2.3.1 Portugal Logistics

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Portugal Logistics
T3M1
Increased efficiency in the transport of goods, by strengthening intermodality and shifting of goods transported by road to rail and maritime modes. Creation of a national network of 12 multi-mode logistics platforms, 2 air cargo centres and a single logistics window (linking of sea-port-land-platform).

51,730

% road traffic on logistics platforms (tkm) 80% 80% 75%

PNAC 2006 measure

a) Description

The objective of Portugal Logistics is to increase efficiency in the supply and transport chains, by strengthening intermodality and increasing the reach of the value chain. Portugal Logistics envisages the setting up of a national network of 12 multi -mode logistics platforms and 2 air cargo centres, along with processes that aid regional development of activities that generate the movement of goods, encourage intermodality by boosting more efficient and effe ctive means of transport and promote technological innovation in the operation of related services.

The definition of the National Logistics Platforms Network entails multifunctional integration of the nodes into both the physical and informa tion flows. In this sense, a new infrastructure is also being developed – the “Single Logistics Window” – with the objective of increasing the competitiveness of the network of infrastructures – the platforms and the main rupture points of the transport chains.

b) Objective

. Increased efficiency in the transport of goods, by strengthening intermodality and shifting goods transported by road to rail and maritime modes with a reduction of 5% by 2015 in the proportion of road traffic on the logistics platforms.
. Percentage of road traffic on the logistics platforms (tkm) of 80% and 75% in 2010 and 2015, respectively.

c) Impact

The consumption of energy avoided in 2015 will be 51.7 ktoe.

### 2.3.2 – Motorways of the Seas

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Motorways of the seas
T3M2
Shift to maritime mode of goods transported by road mode.

51,480 61,089

% shift of international road transport of
goods to maritime mode 15% 20%

PNAC 2006 Measure

a) Description

This measure consists of integrating the National Maritime -Port System into the Motorways of the Seas, by means of the Atlantic and Mediterranean corridors, thereby promoting the transport by maritime mode of goods that were previously exported by

road mode. In order for this measure to be fully successful projects such as the Single Port Window will have to be put into practice.

b) Objective

The objective of the measure is a modal shift of 20% in 2015 of goods exported by r oad mode to the maritime mode.

c) Impact

The assumptions made in quantifying the energy saving associated with the implementation of this measure are those used as a basis for constructing the reference scenario for the PNAC 2006 and the quantification of this measure with a timeframe to 2010.

In order to estimate the energy saving associated with the integration of the National Maritime-Port System into the Motorways of the Seas, by means of the Atlantic and Mediterranean corridors, a shift was assumed to maritime mode of 17.5% of goods transported by road mode. This modal shift corresponds to approximately 5,800 million tonnes of goods shifted, in 2010, and 7,000 million tonn es of goods shifted in 2015.

According to the assumptions made, the modal shift of this volume of goods means that, on average, the goods will cease to travel by road for 150 km in the direction of the land border and will instead make a journey of 20 km in the direction of the maritime border. So, overall, the goods will to make a road journey (HDE) on national territory that is on average 130 km less. The consumption of energy resulting from the implementation of this measure will be of the order of 51.5 ktoe in 2010 and 61 ktoe in 2015.

### 2.3.3 Change in the offering of CP

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010** **2015**

**Targets**
**Indicators** **Current** **2010** **2015**

Change in the offering of CP. Reduction in journey times.
T3M3

Increased use of the railway network.

31,123 33,577

Absolute demand targets in each of the lines
(million pKm)

| | | | |
|---|---|---|---|
| Lisbon - Porto | n.a. | 852 | 943 |
| Lisbon – Algarve | n.a. | 178 | 197 |
| Lisbon – Castelo Branco | n.a. | 70 | 77 |

PNAC 2006 Measure

a) Description

This measure of the PNAC 2006 aims to change the offering of CP through a reduction in journey times between Lisbon and Porto, Lisbon and Castelo Branco and Lisbon and the Algarve. The activities to be carried out under this measure relate to operational efficiency, improvements in the quality of service, a reduction in journey times and an increase in demand.

b) Objective

The objectives that are expected to be achieved for the modal shift of passengers to rail (millions of pkm) are shown below:

| | Current | 2010 | 2015 |
|---|---|---|---|
| Lisbon- Porto | NA | 852 | 944 |
| Lisbon – Algarve | NA | 178 | 197 |
| Lisbon – C. Branco | NA | 80 | 78 |

c) Impact

In order to calculate the energy savings associated with the change in the offering of CP on the Lisbon – Porto, Algarve and Castelo Branco lines, an estimate was made of the demand existing on each line in the absence of the measure and with a change in the journey times.

The energy saving results from the balance of t he energy intensity of each of the modes of transport (train, motor coach and train with electric traction) and is of the order of 31 ktoe in 2010 and 34 ktoe in 2015.

### 2.3.4 – Systems of Energy Efficiency in Transport

### National Energy Efficiency Action P lan

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

SEET System of Energy Efficiency in Transport
T3M4
RGCE Transportes – voluntary agreements 5% reduction in TOE/GVA

5,858 76,593

Energy intensity of goods transport (TOE/GVA) 591 585 550

a) Description

Creation of a licensing scheme for the transport of goods:

. Mandatory average age of fleet of less than 10 years
Review of the Energy Consumption in Transport Management Regulation :
. With plans to improve energy intensity (toe/gva)
. Tax incentives or in the licensing to comply

Boosting of measures and monitoring of approval of plans

. Upgrading of fleets
. Catalytic Reduction Systems (CRS) and fuel economy lubricants
. Fleet/route management systems and eco-driving training/control
. Rail/sea traffic optimisation.

b) Objective

This measure is aimed at achieving the following objectives:
. Reduction of around 5% in energy intensity by 2015.
. Reduction in the proportion of vehicles older than 15 years in the stock of heavy vehicles.

c) Impact

To estimate the energy saving associated with the review of the Energy Consumption in Transport Sector Management Regulation, it was assumed that its application would induce a unitary reduction of 5% in energy consumption (diesel) in the road transport of goods. The calculation of the energy saving was performed using the difference between the consumption factors (l/vkm), multiplied by the number of vehicles covered by the application of the Regulation throughout the period 2008 -2010 and the kilometres travelled by each of them.

For the purposes of the calculation it was assumed that:

. The universe of vehicles covered by the scope of application of the Regulation (eligible fleet) is approximately 22,500 vehicles.
. The reference fuel consumption is approximately 20 l/100 vkm.
. The average kilometres travelled by the vehicles covered, on national territory, is 50,000 km.
. The permit must be renewed every 5 years, meaning that at the end of the period of 5 years all operators are covered by the new regulatory provisions.
. Between 2008 and 2010, the Regulation will be applied for a period of 3 years, meaning that the universe of vehicle effectively c overed is 3/5 (60%) of the eligible fleet.

For the year 2015, it was assumed that 50% of goods transport consumption would have the impact of reducing energy intensity by 5%.

The main results expected are consumptions of energy avoided of the order of 5. 8 ktoe in 2010 and 77 ktoe in 2015.

## 3 – Residential and Tertiary Sector

The measures for improving energy efficiency in the Residential and Tertiary segment are grouped into three main programmes of action:

. Upgrading of Homes and Offices, which group s together the measures encouraging efficiency in the home and in services.

. Energy Certification of Buildings System, which brings together various measures relating to the energy labelling of buildings and the respective programme.

. Instant Renewable s, which covers all the measures relating to access to endo genous sources of energy in the sector.

Various intervention measures are identified in these programmes allowing economies of the order of 283 ktoe and 139 ktoe to be reached in 2015 in the resid ential and tertiary sectors respectively.

## 3.1 – Upgrading of Homes and Offices Programme

This programme is founded on four areas of intervention which aim to make the stock of domestic equipment (domestic electricals and lighting) more efficient, either by direct substitution or by means of a disincentive to buy new equipment with energy performances that are significantly below the best practice already existing in the market, or also by stimulating a change in behaviours in the purchase and consumption of energy.

Objective

To make the stock of domestic equipment (domestic electricals and lighting) more efficient, either by direct substitution or by means of a disincentive to buy new equipment with energy performances that are significantly below the b est practice already existing in the market, or also by stimulating a change in behaviours in the purchase and consumption of energy.

Substitution of equipment

Renove Programme+
Domestic electricals: cheque to substitute old equipment for new
. €100 for A++ class equipment
. €50 for A+ equipment

Efficiency Cheque and subsidised loan for substitution of equipment

Financing of substitution programmes for lamps, storage sets and other equipment (PPEC)

. Phasing-out of incandescent lamps by 2015

. Substitution of 1 million domestic electrical devices by 2015

Disincentive to buy new and inefficient equipment

Tax on inefficient lamps

Restriction on the marketing of the lowest classes of equipment

. Refrigerators – Class E and below
. Air conditioning – COP < 2.5
. Electromagnetic ballast

Information on whole life cycle cost

. Substitution of 5 m incandescent lamps by CFLs by 2015

Remodelling measures

Intervention in the stock of buildings requiring remodelling :

. Efficient Windows measure – encouraging the installation of efficient windows (double glazing and structures with thermal cut-outs).
. Internal/external insulation installation measure

Green Heat measure - Encouraging the installation of :

. Heat exchangers
. Heat pumps (COP >= 4)

. Efficient windows: 200,000 homes
. Heat insulation: 100,000 homes
. Efficient heating: 200,000 homes

Upgrading of office equipment

System of accelerated writing off against tax for the purchase of highly efficient equipment

. Portables
. Efficient photocopiers
. Centralised and multi-function printers
. Cooling systems

Efficient solutions information and publicity programme (energy star)

. Penetration of high efficiency equipment in new purchases of
    . 10% in 2010
    . 20% in 2015

This set of measures is intended to bring energy economies of the order of 180 ktoe in 2015, with emphasis on the very high impact resulting from the transformation of the market for equipment for which a scheme of incentives will be developed aimed at accelerated substitution of inefficient equipment with special emphasis on cooling and lighting equipment.

The substitution measures relate to equipment with a high potential for reduction in total consumption. So, given the degree of penetration and relative proportion of energy consumption, the equipment considered was domestic cooling, laundry, domestic hot water, air conditioning and lighting.

Measures are also being identified aimed at the recovery of buildings in need of rehabilitation and which improve the energy perfo rmance of these, as well as measures intended for the tertiary segment and relating to efficient office equipment.

### 3.1.1 – Substitution of Equipment

The objective of this measure is to stimulate the substitution of old equipment which uses energy inefficiently in the light of current technology, by other more up to date equipment which has a rather lower energy consumption, by proceeding to transform the market in a segment that has a fair impact on domestic consumption.

**National Energy Efficiency Actio n Plan**

**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Substitution of the stock of inefficient equipment
R&S4M1
Acquisition of cooling, refrigeration and freezing equipme nt of classes A++ and A+
13,892 47,536
R&S4M2
Acquisition of efficient laundry equipment (class A)
5,320 14,642
R&S4M3
Substitution of lamps. Phasing-out of incandescent lamps.
35,820 75,022

| | | | |
|---|---|---|---|
| % of stock efficient (A, A+, A++) | | | |
| Refrigerators | 8% | 18% | 37% |
| Freezers | 1% | 7% | 25% |
| % of stock of washing machines efficient (class A) | 1% | 10% | 25% |
| % of CFL in the lighting stock | 15% | 39% | 61% |

3.1.1.1 – Purchase of efficient domestic cooling equipment

a) Description

Financial incentive for the purchase of cooling equipment (refrigerators, freezers or fridge-freezers) with the highest energy classes (classes A++ and A+) when substituting obsolete and inefficient equipment. Creation of a contribution scheme with a value of €100 per item for purchase of Class A++ equipment and €50 per item for purchase of Class A+ equipment to be deducted from the electricity bill or by means of other compensation mechanisms to be developed.

b) Objective

To increase the annual level of penetration of sales of efficient refrigerators (Classes A++, A+ and A), by accelerating the transformation of the stock of such equipment from the current 8% to 37% in 2015. Similarly, for the stock of freezers, to encourage the accelerated transformation of the market with the aim of achieving a level of efficient equipment of 25% in 2015.

The stated objectives allow the achievement in 2015 of a level of penetration of efficient equipment (A classes) that is higher than the European average of around 71%, thereby allowing Portugal to exceed the figure which in 2005 was 49% of sales with a level of domestic sales of 80%.

For freezers, in 2004 sales of efficient equipment (Classes A and A+) accounted for 11% of sales, with the intention being to achieve a penetration of 50% in 2012, equalling the EU 15 average, and 75% in 2015, equalling the best practice, which occurs in Belgium.

c) Impact

The programme in question aims to encourage the purchase of high efficiency equipment, that is Classes A+ and A++ in the case of refrigerators and freezers. It is thus estimated that around 1 million units will be financed by 2015.

Up until 2015 the measure will offer a maximum incentive of €75 million, with it being envisaged that around €50 million will subsidise the purchase of Class A++ equipment and €25 million will be used for the purchase of Class A+ equipment. The financial incentive under this measure will be forthcoming upon delivery of the old device to the national body managing the respective waste, according to a checking mechanism to be defined.

The estimated energy saving in 2015 will be 97,500 toe.

3.1.1.2 Purchase of efficient laundry equipment

a) Description

Encouraging the purchase of high efficiency laundry equipment, that is to say washing machines of higher than Class A.

b) Objective

To increase the annual level of penetration of sales of efficient equipment, allowing an efficient stock of 25% to be achieved in 2015. The stated objectives allow the achievement in 2015 of a level of sales of such equipment that is higher than the European average, at around 75%, thereby allowing Portugal to significantly exceed the share for efficient equipment which in 2005 was 49%.

It should be mentioned that the designation of an efficiency class higher than A, for this type of equipment, is not defined by the Directive on energy labelling, but corresponds to a voluntary agreement of the ECDEM (European Committee of Domestic Equipment Manufacturers) organisation.

c) Impact

It is estimated that the transformation of the market will allow economies to be achieved of 14,700 toe in 2015, which will correspond to the substitution of around 1.2 million inefficient items of equipment.

To sum up, the measures set out for cooling and laundry equipment will allow a change in the energy outlook of such devices which currently account for around 40% of electricity consumption in the residential sector. It can thus be expected that more than half the domestic stock of domestic electrical e quipment will be highly efficient in 2015.

**3.1.1.3 – Phasing-out of incandescent lighting**

a) Description

Adoption of national programmes that are conducive to the substitution of incandescent lamps by compact fluorescent lamps or similar, creating condi tions for changeover of the stock installed by 2015 and the progressive phasing out of conventional incandescent lighting.

b) Objective

This measure is aimed at brin ging about a transformation in the lighting market, through the substitution of inefficie nt technologies (incandescent lamps) by high performance alternatives (compact fluorescent lamps or other efficient technologies).

Lighting has strong potential for improved energy efficiency and accounts for around 14% of national electricity consumption , the equivalent of 6.4 TWh/annum.

c) Impact

In average terms, lighting represents approximately 12% of consumption of electrical energy by the domestic sector (1.5 TWh/annum), 20% of that by the tertiary sector (3.3 TWh/annum) and 10% of that by industr y (16 TWh/annum) and thus offers potential for energy economy that demands to be exploited. Conventional incandescent lamps can today be advantageously substituted by compact fluorescent lamps that consume only 20% of the energy consumed by the former and last for up to eight times longer. Developments are also taking place in the area of halogen lighting with solutions that are highly efficient compared with conventional incandescent lighting.

In the domestic sector, in particular, where it is estimated t hat conventional incandescent lighting may account for around 77% of lighting consumption, alternatives are available that are much more efficient and with a substantially higher lifetime.

The above illustrates that there is a huge potential for energy sa vings in the lighting sector, and for that reason this measure essentially aims to encourage the substitution of conventional incandescent lamps by compact fluorescent lamps (C FL) or other efficient technologies. This measure has a period of return on inve stment that is generally less than 2 years.

The estimated potential energy saving with this measure is 75 ktoe by 2015, and involves the substitution of around 22.6 million incandescent lamps.

The following diagram shows in detail the assumptions and con clusions, taking as a basis the energy impact of this measure in the residential sector of a non -seasonal nature, that is to say with permanent occupation.

Expected change in the stock of lamps in the residential sector
Millions of lamps

Incandescent
Halogen
Fluorescent
CFL

No. of homes (M)
No. of lighting outlets/home
Consumption of energy
. Per home (kWh)
. Mix of lamps 2005 (k toe)
. Expected mix (k toe)
Reduction in consumption (k toe)

Note: estimated values; impacts include the effects of the subst itution programme and the publicity campaigns

Source: ADENE/DGEG analysis

### 3.1.2 - Discouragement of the acquisition of new inefficient equipment

**National Energy Efficiency Action Plan**

**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Discouragement of the acquisition of new inefficient equipment
R&S4M4
Tax on inefficient equipment. Restrictions on the marketing of equipment of the lowest classes. Information on whole -life-cycle-cost
537 4,393

% sales of efficient equipment
(class A or above) 50% 75% 90%

a) Description

Residential and service buildings today are responsible for more than 60% of electricity consumption, and thus account for a significant proporti on of emissions from the production of electrical energy using fossil fuels.

In this context, a legislative measure has been drawn up to penalise the use of low efficiency lamps, with the creation of a tax on the marketing of low energy efficiency lamps which aims, on the one hand, to compensate for the burden that the use of such lamps places on the environment and, on the other, to stimulate achievement of the national objectives on $CO_2$ emissions by reducing environmental impacts at the local, regional and national levels.

Furthermore, this tax will provide the necessary funds to encourage producers and consumers to use more efficient and economically beneficial solutions, by providing the funding for information campaigns and equipment substitution schemes, with the aim of raising awareness and motivating citizens to make decision s that are more consistent with the sustained development of society.

In parallel with this legislative measure, the creation is envisaged of regulations that restrict the marketing of the lowest classes of equipment along with the development of mechanisms that aid and inform the consumer during the process of acquisition of new equipment with presentation of informati on on the whole-life-cycle cost or the mandatory display of the efficiency class on equipment in a permanent manner and not just during the period when this is being acquired.

b) Objective

The objective to be achieved in 2015 will be to reach an annual level of sales of efficient equipment of 90% (class A or high er) and to make a contribution to improving the energy performance of this.

c) Impact

This measure is expected to lead to possible economies of 4.5 toe in 2015.

### 3.1.3 Remodelling Measures

Energy efficiency in the context of upgrading the residential s tock will have to be based on a proper analysis of the needs for air conditioning within buildings, a parameter which is becoming increasingly important and one that is associated with comfort and well - being and which can be approached from two different a ngles, firstly that of maintaining comfortable temperatures and secondly the generation of heat/cold in an efficient manner.

The maintenance of comfortable temperature conditions considered by this plan includes two interventions directly associated with the fabric of buildings:

. Efficient Windows, aimed at dealing with glazed areas, either by using double glazing, or use of supporting structures with thermal cut -outs, or the use of efficient glass (low emissivity).

. Thermal insulation, aimed at the ap plication of thermal insulation to roofs, flooring and, principally, walls.

The area of efficient heat/cold generation includes the following interventions:

Green Heat, whereby a specific programme for promoting heat exchangers is developed.

In addition to this, mechanisms will be created that encourage the use of efficient heat pump type air conditioning equipment with a COP (coefficient of performance) of equal to or greater than 4.

**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Remodelling measures
R&S4M5
*Efficient windows*. Upgrading of glazed areas
1,335 3,735
R&S4M6
*Efficient insulation*. Installation of insulating materials
710 1,987
R&S4M7
*Green heat*. Installation of biomass-powered heat exchangers, micro-cogeneration with biomass or heat pumps (COP >= 4)
6,247 16,020

| | | |
|---|---|---|
| Total number of homes | 60,000 | 160,000 |
| m2 installed | 600,000 | 1,600,000 |
| Total number of homes | 30,000 | 80,000 |
| m2 installed | 1,500,000 | 4,000,000 |
| | | |
| Total number of homes | 7,500 | 20,000 |

### 3.1.3.1 – Efficient Windows Measure

a) Description

The aim of this measure is to encourage the substitution of energy-inefficient glazing and frames in the existing building stock that are in need of repair. The recommended solutions are the substitution of single glazing by double glazing and the use of frames with a thermal cut-out, as well as the use of efficient glass with low emissivity.

b) Objective

The objective of this measure is the rehabilitation of the glazed areas of around 160,000 homes by 2015, with the installation of 1.6 million $m^2$ of more efficient glass in place of single glazing in the housing stock in need of repair.

c) Impact

Windows are the most vulnerable elements of the fabric of buildings and are responsible for a large part of the thermal energy consumed inside them. In fact, it is estimated that between 25% and 30% of heating requirements are due to loss of heat through glazed areas.

The rehabilitation of these areas allows a reduction in the uncontrolled infiltration of air, an increase in the utilisation of sunlight in winter and a reinforcement of the protection from solar radiation in summer by improving the natural ventilation conditions. Double - glazed windows reduce by almost half the loss of heat compared with single glazing.

The estimated potential energy saving for this measure is 3,735 toe by 2015, covering around 20,000 homes each year and installing approximately 200,000 $m^2$ of efficient glass annually.

Promoting the installation of more energy-efficient glass and frames will be furthered by the implementation of programmes to be arranged.

### 3.1.3.2 – Efficient Insulation Measure

a) Description

This measure aims to encourage the application of efficient insulation in the existing building stock in need of repair.

b) Objective

The objective of this measure is the rehabilitation of the insulation in approximately 80,000 homes by 2015, with the installation of around 4 million $m^2$ of efficient insulating materials in the building stock in need of repair (estimated at around 1.7 million homes).

c) Impact

The use of thermal insulation in buildings is fundamental in minimising energy losses and increasing comfort within air conditioned spaces. Small improvements in the insulation of buildings can lead to energy savings of up to 30%, avoiding unnecessary costs in the heating and cooling of spaces.

The use of insulating materials in construction is essential in meeting the high quality standards demanded by the regulations currently in force. In addition to energy economy, thermal and acoustic comfort, along with air quality, are major factors in which insulation plays a vital role.

The estimated potential energy saving for this measure is 1,987 toe in 2015, covering some 10,000 homes each year with the installation of approximately 500,000 $m^2$ of insulation annually. The impact of this measure will be felt in a reduction in energy consumption for air conditioning in 2015. Under this programme a mechanism for financing the measure will have to be created.

### 3.1.3.3 – Green Heat Measure

a) Description

This measure aims to encourage the application of heat exchangers in the residential sector in addition to or in place of traditional means of ambient heating such as open fires.

b) Objective

The objective of this measure to encourage the installation of biomass heat exchangers is the installation of around 20,000 devices by 2015, in a housing stock of approximately 5.5 million homes.

c) Impact

The engineering and electronic technologies applied in pellet heat exchangers make these a heating solution that is easy to install, efficient, technologically advanced, simple, clean and safe, cheap and ecological.

Heat exchangers combine the advantages of pellets with their inherent forced air system, allowing them to uniformly distribute the hot air produced inside them over the areas to be heated, with approximately 90% recovery of the heat generated (just 15% of the heat from a normal fire is used). The low cost of the biomass makes this source of energy competitive compared with conventional energies for heating.

The potential energy saving estimated for this measure is 16,020 toe by 2015, involving intervention in around 2,500 homes annually.

Heat exchangers are considered to be a renewable energy source and so they are subject to VAT at the intermediate rate. 30% of the sums spent on the acquisition of new equipment, including ancillary equipment that is essential to its operation, is also tax deductible.

In order to achieve the set objectives it is considered that this sector requires a boost in Portugal by conducting awareness-raising campaigns among the general public in order to demonstrate the benefits of this technology.

### 3.1.4 Upgrading of Office Equipment Measure

**National Energy Efficiency Action Plan**

**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Upgrading of office equipment
R&S4M8
Substitution of office equipment. Accelerated depreciation of efficient equipment, to encourage the substitution of desktops by laptops, A/A+ photocopiers or multifunction systems
6,258 16,280

Number of substitutions 200,000 1,500,000

a) Description

To promote the substitution of low efficiency desktop computers by portable computers with lower energy consumption by setting up a programme of incentives to enterprises involving a system of accelerated depreciation for the acquisition of high efficiency equipment.

b) Objective

The objective to be reached with this measure is the substitution of around 200,000 computers, which will lead to a transformation of the computer stock (substitution of 50% of the stock liable to substitution).

c) Impact

The consumption of energy associated with information technology (IT) has grown considerably in recent years as a result of its increasing penetration in the residential and tertiary sectors. It is estimated that office equipment accounts for between 20 and 40% of total consumption in office buildings. On the other hand, the potential for economically viable energy savings could be as high as 50%.

Energy economies can be obtained by suitable selection of energy -efficient products and equipment, the introduction of energy management systems and the adoption of good practices in the use of equipment.

The option of bulk purchase (procurement) of energy efficient office equipment is of particular relevance as is the rational use of the equipment.

Portable computers are the most obvious way of saving energy when using computers in the home or office, since the consumption of energy is a decisive factor in the design of portable computers such that these will have screens (LCD), adaptors, hard discs and CPUs with high energy performance.

The potential energy saving for this measure is estimated at 16,280 toe in 2015, with the substitution of around 1,800,000 computers over this period.

### 3.2 Energy Certification of Buildings Programme

The Energy Certification Programme aims to improve the energy performance of buildings by improving the average energy efficiency class of the building stock through the implementation of the guidelines governing the Energy Certification System (SCE).

Objective

To improve the energy performance of buildings by improving the average energy class of the building stock through the implementation of Energy Certification System

National System for Certification of Energy and Air Quality Within Buildings (SCE)

Phased implementation of the Energy Certification System in accordance with that laid down in the respective statutory regulation, specifically:
. Phase 1 – with effect from 1 July 2007 - for new large residential and service buildings (1,000 $m^2$) or major upgrades.
. Phase 2 – from 1 July 2008 – for all new residential and service buildings irrespective of the area or purpose.
. Phase 3 – from 1 January 2009 – for existing residential and service buildings, at the time that sale or lease contracts are agreed or whose area is in excess of 1,000 $m^2$.

. Residential: 200,000 homes/annum certified
. Tertiary: 20,000 units/annum certified

Efficiency in residential buildings

Progressive alignment of taxation with the energy class of buildings

. At the IRS, awarding of 10% of the benefits associated with housing credit for Class A/A+ buildings

Access to subsidised loans for implementation of energy efficiency and rehabilitation measures provided for in the energy certificate

. 1 in every 15 homes with an efficient energy class (B- or higher)

Efficiency in Services

Mandatory for buildings > 1,000 $m^2$
. Conducting of energy audits every 6 years and periodic inspections of boilers and air conditioning systems
. Maintenance and engineering plan responsible for the correct operation of air conditioning systems

Boosting of the installation of energy monitoring and management systems
. Mandatory for equipment with a power of > 100 kW (monitoring) and 200 kW (management)

Incentive for cogeneration through boosting of viability studies
. Mandatory for buildings > 10,000 $m^2$ in the health, tourism and commercial sectors

Regulation of lighting with a maximum W/$m^2$ according to use

. 30% of the stock > B- in 2015
. 50% of major repairs A

The National System for Certification of Energy and Air Quality Within Buildings (SCE) is one of the three pillars upon which the new legislation relating to the thermal quality of buildings in Portugal is based and which aims to provide significant energy economies. Along with the provisions that have accompanied the technical regulations applicable in this area to residential buildings (Buildings Thermal Performance Regulations – RCCTE, approved by Decree-Law No. 80 of 4 April 2006) and to service buildings (Buildings AC Energy Systems Regulations – RSECE, approved by Decree-Law No. 79 of 4 April 2006), the SCE defines the rules and methods for verifying the effective application of these regulations to new buildings and, at a later stage, to buildings already constructed.

The RCCTE looks to establish quality requirements for new residential and small service buildings without air conditioning systems, specifically at the level of the fabric (walls, glazing, flooring and roofs), by limiting heat losses and controlling excessive solar gains.

This regulation sets limits on the energy consumptions of the dwelling for air conditioning and production of hot water, with a clear incentive to use efficient systems and energy sources with less impact in terms of consumption of primary energy. The new legislation also establishes an obligation to install solar panels and assesses the use of

other renewable sources of energy in determining the energy performance of the buildings.

The RSECE also looks to define a set of requirements applicable to service and residential buildings provided with air conditioning systems, which, in addition to the aspects of quality of the fabric and limitation of energy consumption, cover the efficiency and maintenance of air conditioning systems in buildings, and make periodic audits of service buildings mandatory. In this regulation, the quality of the internal air is also one of the requirements dealing with the rates of renewal of air within the spaces and the maximum concentration of the main pollutants.

The application of these regulations is verified at various points throughout the lifetime of a building, with this verification being performed by experts duly qualified for the purpose. It is these agents who, in practice and along with the ADENE, will ensure the operability of the SCE.

The most visible aspect of this work will be the Energy and Internal Air Quality Certificate issued by an expert, for each building or unit, and in which these will be rated on a predefined scale of 9 classifications (A+ to G).

The issue of the certificate by the expert will take place by means of a supporting IT system set up to provide a centralised register of certified buildings.

This programme has a very high potential for energy savings in 2015, with the prospect of achieving economies of the order of 200 ktoe, through improved energy performance of new buildings under construction, but also by including measures for efficient rehabilitation of the existing stock of buildings.

### 3.2.1 - Efficiency in Residential Buildings Measure

**National Energy Efficiency Action Plan**

**Programme and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**

| **Indicators** | **Current** | **2010** | **2015** |
|---|---|---|---|
| Residential buildings | | | |

R&S5M1
Achievement in new buildings of minimum quotas by efficiency classes
Programmes for remodelling of the stock requiring repairs
34,792 94,436

No. of certificates issued 170,308 475,159

PNAC 2006 Measure

a) Description

The Energy Certification System requires that new buildings or major rehabilitation projects achieve minimum levels of efficiency ratings. In addition, under the specific regulations it will be possible to develop specific mechanisms to boost improvements in the energy classes of buildings.

b) Objective

The objective is to certify 475,000 new or upgraded homes by 2015, that is, to achieve by that year a proportion of 10% of the stock with an energy class of B⁻ or higher.

| Certified Homes | Annual Average 2007 – 2015 | Accumulated 2015 |
|---|---|---|
| New Homes | 34,000 | 272,000 |
| Upgrades | 25,000 | 203,000 |
| Total | 59,000 | 475,000 |

It is estimated that each year 50,000 new homes are being built, which will naturally constitute the principal basis of energy certification. In addition to these homes, consideration will have to be given to large - and medium-scale upgrades which due to being for sums in excess of 25% of the value of the property, fall within the framework of Energy Certification.

The current housing stock comprising around 5.5 million homes, according to estimates by the National Statistical Institute, includes more than 2 million home in need of some type of repair. Of this universe, around 740,000 homes require large - and medium—scale repairs, and it is estimated that each year some 25,000 upgrades can take place.

c) Impact

Energy certification can lead to average economies of 30 to 40% in energy consumption, resulting from at least five areas: upgrades, insulation, heat bridges, glazed areas and shading.

The energy savings become clear upon analysis of the consumption of a family home of 4 people, and urban consumption patterns, consuming 4,400 kWh per annum, which can by

means of the improvement measures achieve savings of around 30%, with a breakdown of 16.5% from the solar component, 6.6% from insulation, 0.7% from heat bridges, 5.7% from glazing and 0.4% from the shading component.

On the other hand, looking at the impact exclusively in terms of the heat component, not considering the use of biomass, it can be seen t hat the energy certification can boost energy economies to fairly high levels, reducing consumption for heating purpos es by more than two thirds. This result increases the compatibility of this plan with the PNAC , looking to establish a more ambitious target of 50%.

It is estimated that certification can contribute more than 94 ktoe of energy savings, on the bases of the stated assumptions.

### 3.2.2 – Efficiency in Services Measure

### National Energy Efficiency Action Plan

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Service buildings
R&S5M2
Achievement in new buildings of minimum quotas by efficiency classes.
Increased penetration of cogeneration systems. Implementation of solar heating and micro-production in schools
32,561 98,386

No. of certificates issued 9,427 22,705

PNAC 2006 Measure

a) Description

The Energy Certification System requires that new buildings or major rehabilitations achieve minimum levels of efficiency ratings. In addition, when the specific regulations are issued, mechanisms can be deve loped that strengthen the improvement in energy ratings in buildings.

b) Objective

The objective is, by 2015, to certify approximately half of service buildings with an energy class of B- or higher.

c) Impact

Energy certification produces potential eco nomies in excess of 30% as a result of interventions in the following areas: renewables (5%), insulation (6%), heat bridges (1%), glazed areas (9%) and shading (1%), lighting (21%) and air conditioning systems (3%).

Each year more than 3,000 service build ings are licensed, with more than 50,000 being processed, with energy certification being mandatory for all new buildings and for existing ones after 2009, meaning that energy efficiency measures may have to be taken in both types of buildings.

The estimated impacts are 98,386 toe resulting from the issue of 22,700 certificates, in the year 2015.

Other areas to be promoted in connection with this programme include measures to boost the installation of energy monitoring and management systems which allow m ore rigorous control of the use of energy sources.

Cogeneration systems will also have to constitute an alternative and a more common practice in the tertiary sector, so that mechanisms will be developed that support the viability of these systems. In add ition, studies will be performed which will allow the development of a lighting regulation which accounts for a highly significant proportion of final energy consumption in the sector. Therefore best practice will be defined and relevant indicators identif ied for the various sub -sectors.

### 3.3 – Instant Renewables Programme

This programme aims to promote the substitution of consumption of fossil energy by renewable energy, through greater ease of access to micro -generation of electrical energy and solar heating of domestic hot water.

Objective

To promote the substitution of consumption of non -renewable energy by renewable energy through greater ease of access to micro -generation and solar heating technologies

Instant renewables: micro -generation

Simplified registration system for the installation of renewable micro -generation of up to 5 kW

. 10 MW per annum increasing by 20% per annum

Mandatory installation of 2 $m^2$ of solar thermal to access the preferential tariff

. Estimated at approximately 1 $m^2$ per kW installed

Exemption from municipal licensing for small installations
. 165 MW installed capacity

Instant renewables: Solar Thermal Programme

Publicity campaigns

"Renove – Solar Térmico" programme

. Support for revitalising existing solar therm al installations

Programme of incentives to install new solar thermal

. Tax relief on up to 30% of the investment allowed by the IRS

Mandatory installation of solar thermal in new buildings

Programmes aimed at specific segments

. Social housing
. Pools and changing rooms
. Solar condominium

. 1 in 15 buildings with Solar Thermal

The Instant Renewables programme is intended to encourage the use of renewable sources of energy, allowing the achievement in 2015 of impacts of the order of 48,471 toe and based on the range of targets indicated in the table below.

The Solar Thermal measure is compatible with that provided for in the PNAC, and actually foresees the bringing forward of the respective targets. With the targets set out in this plan for 2015, it is expected that 1,385,665 $m^2$ will be installed (the average value for the 14 years envisaged in the PNAC measure is approximately 100,000 $m^2$/annum).

### 3.3.1 – Electricity Micro-production Measure

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Micro-production
R&S6M1
Encouraging micro-production (photovoltaic, wind, hydro, biomass, etc.)

Residential

8,793 23,447

| | | |
|---|---|---|
| Installed power | 62 | 165 |
| No. of installations | 21,788 | 58,100 |

a) Description

Boosting of the decentralised production of electrical energy or combination of electrical and thermal energy, using renewable energy sources in Portugal.

This measure allows low voltage electricity production to be performed by individual and group entities, with the possibility of supply of energy from micro-production installations up to a limit of 5.75 kW to the public electricity system.

In order to make this measure feasible, the administrative processes have been made more flexible and the licensing system simplified. This is now governed by a new system of registration subject to an inspection for technical conformity.

b) Objective

The Government is aiming for 165 MW of installed power in micro-generation in 2015, which is almost the equivalent of a large dam.

c) Impact

Decentralised production of electrical energy is based on technologies for the conversion of renewable energy, specifically solar, wind, wat er, biomass cogeneration and fuel cells.

The technologies for conversion of solar, wind and water power are at an advanced stage of maturity, with applications in the residential, tertiary and industrial sectors. Nevertheless, actual application in buildi ngs will depend on the potential of the resource in the area, the nature of the application and the spatial -functional characteristics of the buildings in question.

In the cases of biomass cogeneration and fue l cells, due to the current stag e of development of these technologies the projection of the degree of penetration of these is subject to a number of reser vations. The reference targets o f the various measures are as follows:

. Photovoltaic: 50,000 buildings (15 ktoe );
. Wind: 5,000 buildings (2 ktoe );
. Water: 2,000 buildings (4 ktoe);
. Fuel cells: 1,000 buildings (2 ktoe).

### 3.3.2 – Thermal Micro -production Measure

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermedia te scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Solar Thermal
R&S6M2
Publicity campaigns.
“Renove – Solar Termico” programme. Programme of incentives for installation of new solar thermal.
Mandatory installation of solar thermal in new build ings.
Programmes oriented at specific segments.

Residential

| | | | |
|---|---|---|---|
| 5,446 | 13,844 | | |
| Tertiary | | | |
| 4,236 | 12,180 | | |
| Total installed area (m2) | | 417,410 | 1,113,093 |
| | | 102,215 | 272,572 |

a) Description

Boosting of solar thermal in Portugal with the creation of a financial incentive that reduces the cost of solar thermal systems, allowing the barrier of the high initial outlay on their acquisition to be overcome.

b) Objective

The objective to be reached with the thermal micro -production measure is aimed at the creation of a market supported by 175,000 m2 of solar collectors installed per annum leading to a number of collectors installed and operational by 2015 of the order of 1.4 million $m^2$, which will represent approximately 1 in 15 buildings with Solar Thermal.

This programme also aims to revitalise the stock of existing equipment, creating favourable conditions for the substitution and/or specialist repair/maintenance.

c) Impact

It is estimated that through the implementation of the indicated area of solar thermal economies of 58,796 toe can be achieved in 2015, in the residential and tertiary sectors.

## 4 – Industry Area

Objective

To promote increased energy efficiency by means of a change in production processes, the introduction of new technologies and a modificat ion of behaviours

Energy Consumption-Intensive Management System (SGCIE)

Mandatory energy audits, including a Plan for Rationalisation of Energy Consumption (PREn) and biannual implementation and progress reports
- Enterprises > 1,000 toe/annum: 6 year p eriods
- Enterprises > 500 toe/annum: 8 -year periods

Enterprises with energy consumptions of less than 500 toe/ annum may sign up voluntarily to the SGCIE.

Establishment of targets on energy and carbon intensity to be achieved within the context of the PREn and mandatory implementation of measures with very short payback periods

. Implementation of measures with a payback of < 5 years (enterprises + 1,000 toe/annum) and < 3 years (other enterprises)

In the event of non-compliance with these targets and measures, payment of a penalty for each toe not avoided or repayment of sums received

. Possibility of reimbursement of 75% of the value of the penalties provided that the deviations are recovered in the following year

Competitive energy in industry programme

Boosting of horizontal savings measures and specific measures in 12 industrial sub-sectors

. Horizontal: Optimisation of electric motors, efficient production of cold and heat, efficient lighting and efficiency of processes
. Specific (e.g. optimisation of ceramics kilns, gasification and drying in pulp and paper, new separation operations and catalysts in the chemical sector, etc.)
. Training and awareness-raising activities for energy managers
. Monitoring of measures in the Energy Consumption Rationalisation Agreements (ARCE)

Support for operators with Energy Consumption Rationalisation Agreements
. Exemption from ISP
. Partial indemnification of costs of energy audits
. Indemnification of 25% of investments in equipment and systems for the management and monitoring of energy consumption

Promotion of the installation or conversion of cogeneration systems
. Review of tariff and the licensing system with encouragement to convert to natural gas and biomass

Efficiency support measures in the context of the QREN
. Launching of energy efficiency competitions in connection with the System of Incentives for Qualification and Internationalisation of SMEs
. Financing of up to 35% of expenditure on energy efficiency for candidates under the System of Incentives for innovation

### 4.1 Energy Consumption-Intensive Management System

Extension to 2015 of the measure from the PNAC 2006 relating to the revision of the RGCE – Energy Consumption Management Regulation with details and clarification of the sectoral and horizontal measures, maintaining the $CO_2$ emission levels defined in the document.

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2015**

**Targets**

| **Indicators** | **Current** | **2015** |
|---|---|---|
| Energy Consumption-Intensive Management System | | |
| I7M1 | | |
| **Horizontal measures in industry**: | | |
| - Electric motors | | 27,079 |
| - Production of heat and cold | | 164,429 |
| - Lighting | | 1,911 |
| - Energy efficiency of the industrial/other processes | | 155,163 |
| I7M2 | | |
| **Sector-specific measures:** | | |
| - Food, drink and tobacco | | 6,242 |
| - Textiles | | 2,296 |
| - Pulp and paper | | 9,588 |
| - Chemicals, plastics and rubber | | 9,340 |
| - Ceramics | | 8,728 |
| - Metal working and founding | | 730 |
| - Glass | | 3,044 |
| - Cement | | 0 |
| - Clothing, footwear and leather | | 79 |
| - Iron and steel | | 2,594 |
| - Wood and wooden articles | | 527 |
| - Metal, electromechanical | | 1,089 |
| I7M3 | | |
| Savings in other sectors of activity (SGCIE) | 118,717 | |
| I7M4 | | |
| **Retroactive measures** | | 24,800 |

| | | |
|---|---|---|
| Energy intensity of industry | 339 | 302 |
| % of savings in other sectors of activity | | 12% |
| Total | | 536,356 |

a) Description

Drawing up of legal provisions which govern the Energy Consumption-Intensive Management System (SGCIE), set up with the aim of promoting energy efficiency and monitoring the energy consumptions of energy consumption -intensive installations.

This will cover energy consumption -intensive installations that have an energy consumption of more than 500 tonnes of oil equivalent per annum (5 00 toe/annum).

Operators of energy-consumption intensive installations will be subject to the following obligations:

. Promoting the registration of the installations.
. Performing energy audits which assess in particular all aspects relating to promotion of an overall increase in energy efficiency, and which may also include aspects relating to the substitution by fuels from renewable sources and other measures to reduce the energy spend.
. Drawing up of Consumption Rationalisation Plans aimed at an overall increase in energy efficiency through the meeting of targets.
. Executing and adhering to the approved PRENs, under the responsibility of an accredited engineer.

The objective of these programmes is to promote increased energy efficiency by means of a change in production processes, the introduction of new technologies and a modification of behaviours.

b) Objective

Overall potential for energy economy of around 536.4 ktoe/annum for manufacturing industries, extractive industries, agriculture and fisheries and construction and public works.

c) Impact

The increase in energy efficiency in manufacturing industry calls for a process, similar to that adopted in other countries, that shows a pro-active attitude on the part of industry in terms of how they effectively adapt their equipment and processes to new technologies and currently available strategies.

Documents were analysed relating to BAT – Best Available Technologies, published previously by the European Commission, and by countries such as Spain, Holland and the USA through the U.S. Department of Energy. Other documents published by the International Energy Agency were also used as a reference for making a choice, from among a large number of measures for action which can, in the Portuguese context, lead to greater energy efficiency of all sectors of manufacturing industry.

Analysis of said documents led to two sets of measures classified as Horizontal Measures and Specific Measures for each sector of manufacturing industry.
The Horizontal Measures implement four groups of technological activity: Electric Motors, Production of Heat and Cold, Lighting ad Other measures for Efficiency of the Industrial Process. These measures were grouped as a result of their general applicability in the twelve sectors of manufacturing industry. In addition to these measures, within each of the sectors, the said Specific Measures were selected which are the implementation of possible activities that are only applicable with a considerable intensity in each specific sector.

| Horizontal Measures | |
|---|---|
| Area | Measure/technology |
| Electric Motors | Optimisation of motors<br>Pumping systems<br>Ventilation systems<br>Compressor systems |
| Production of Heat and Cold | Cogeneration<br>Combustion systems<br>Heat exchangers<br>Industrial cooling |
| Lighting | Efficient lighting |
| Efficiency of the Industrial Process/Other | Monitoring and control<br>Treatment of effluents<br>Process integration<br>Maintenance of energy consuming equipment<br>Thermal insulation<br>Transport<br>Training and awareness raising of human resources<br>Reduction in reactive power |

| Specific or sectoral measures | |
|---|---|
| Sector | Measure/technology |
| Food and Drink | Optimisation of sterilisation<br>Membrane separation processes<br>Switch from horizontal to vertical m ills<br>Vacuum distillation |
| Ceramics | Optimisation of kilns |

| | |
|---|---|
| | Improving driers<br>Steam extrusion<br>Hard extrusion<br>Optimisation of the production of powder<br>Use of alternative fuels |
| Cement | Optimisation of mills<br>Use of alternative fuels (e.g. biomass)<br>Reduction in the use of clinker in cement<br>Use of natural gas (instead of pet coque) |
| Wood and Wooden Articles | Mechanical rather than pneumatic transporters<br>Use of biomass by-products<br>Optimisation of continuous drying ovens |
| Metal electro-mechanical | Submerged combustion to heat baths<br>Re-use of waste<br>Optimisation of ovens |
| Metal Working and Founding | Improvement in the quality of anodes and cathodes<br>Fusion sector<br>Number of castings per cavity<br>Performance of cast metal<br>Reduction in the level of rejects<br>De-dusting<br>Increase in cycle rates<br>Reduction in finishing allowances |
| Pulp and Paper | Gasification/burning of black liquor and other residues<br>Optimisation of drying |

| Specific or sectoral measures | |
|---|---|
| Sector | Measure/technology |
| Chemicals, Plastics and Rubber | New separation operations (e.g. membranes)<br>Use of new catalysts<br>Optimisation of distillations |
| Iron and Steel | Improvements in electric furnaces<br>Smelting reduction processes<br>Simultaneous moulding and forming |
| Textiles | Optimisation of the operation of baths<br>Mechanical / IR pre-drying<br>Solar panel heating of water<br>Optimisation of textile production processes |
| Clothing, Footwear and Leather | Improvements in cleaning / baths<br>Part cutting and joining technologies<br>Solar panel heating of water |

| | |
|---|---|
| Glass | Optimisation of furnaces<br>Use of recycled glass |

### 4.2 - Competitive energy in industry programme

This programme is aimed at supporting the SGCIE and looks to assist industrial enterprises to more easily reach their respective targets for increased energy efficiency with a simultaneous reduction in the corresponding energy spend. To this end four priority action areas have been defined:

. Boosting horizontal savings measures and specific measures in the 12 industrial sub - sectors.
. Assisting operators with Energy Consumption Rationalisation Agreements of the SGCIE.
. Promoting the installation or conversion of cogeneration systems.
. Efficiency support measures in the context of the QREN.

## 5 – State

### 5.1 – Energy Efficiency of the State Programme

To provide a framework for the efficiency of the State, an Energy Efficiency of the State Programme (Programme E3) has been created, comprising four areas of intervention: Buildings, Transport, Ecological Purchasing and, finally, Public Lighting.

The greatest economies are to be made in the area of the energy consumed in the more than 15,000 State premises, where each year 1.1 TWh of electrical energy are consumed which, added to the liquid and gaseous fuels consumed, amounts to a total of more than 360,000 toe of final energy.

Public lighting, understood to be all the consumption by national, regional and local street lighting, and the traffic signalling system, consumes around 1.4 TWh (120,000 toe) annually.

In the area of transport the aim is to achieve a reduction in consumption of 10% by 2015, compared with the reference year concerned (in the intervention in question).

The area of ecological public procurement aims to introduce energy efficiency criteria into the acquisition of equipment with the selection of entities with approved energy efficiency improvement plans.

Objective

The behaviour of the State must represent a benchmark for the market, and so the intention is to reduce the energy consumed in the State Sector at a faster rate than that

defined as a general target in the European Directive, through the implementation of measures aimed at energy efficiency and changing consumption behaviours.

Buildings

Energy audits for all State Buildings by 2015

. Priority for installations with consumptions in excess of 25 GWh/annum (75% of energy)

Conversion of 20% of the building stock to class B - or higher by 2015 and installation of:

. 100% of public pools and changing rooms with solar thermal
. 50% of schools with renewables
. 25% of hospitals with cogeneration

Financing of energy efficiency measures in State buildings

. Efficiency Contract

Centralisation of the energy procurement process at the National Public Procurement Agency

. 100% of State buildings with energy certification by 2015
. 20% of State buildings with class B - or higher
. Upgrading of school buildings

Transport

Phasing out of vehicles with $CO_2$ emissions in excess of 200g/km by 2015

$CO_2$ emission targets for car stock

Acquisition of vehicles subject to them being on the short list of efficient vehicles

. With an emissions index of less than 110 g/km from 2010 onwards

Mobility plan for organisations with more than 500 workers at the same site

.1/5 of fleet with less than 110 g/km

Ecological public procurement

By 2010 half of public tenders to have environmental criteria in the context of measures for energy efficiency (EE) and decentralised production of energy (ERs):

. High efficiency lighting
. Equipment and materials used in the design and construction of public works to be subject to ecological criteria with respect to energy/environment
. Internet site with supporting information in the area of E E and ERs
. Transport equipment and services subject to policies limiting the maximum consumption per km and scrapping of vehicles
. Office equipment (IT, communications, pri nting and copying)

. 50% of public contracts for the purchase of goods or services covered by the National Strategy for Ecological Public Procurement 2008 -2010

Public lighting (PL)

Substitution of existing equipment and accessories in the stock by other s that are more efficient

. Light flow regulators
. Phasing out of mercury lamps
. Programme for LEDs in 20% of traffic lights, 10% with photovoltaic power
. Substitution of ferromagnetic ballast by electronic accessories
. Ongoing substitution of capacitors

New (replacement or original) installations that meet minimum energy efficiency requirements

. Creation of a public lighting regulation

. Reduction by 2%/annum in PL (30 GWh/annum)
. Substitution of 300,000 mercury lamps
. 20% of traffic lights with LED lighting

### 5.1.1. Buildings

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**

| Indicators | Current | 2010 | 2015 |
|---|---|---|---|
| Buildings | | | |
| E8M1 | | | |
| Energy certification of State buildings | | 4,652 | 16,401 |
| E8M2 | | | |
| Solar thermal – Swimming pools. Installation of solar thermal systems for DHW in pools and changing rooms | | | |
| E8M3 | | | |
| Solar thermal – Sports premises. Installation of solar thermal systems for DHW. | | 2,301 | 6,138 |
| E8M4 | | | |
| Micro-producer schools. Installation of electrical energy micro -production systems in State schools. | | 605 | 1,613 |
| E8M5 | | | |
| Hospital cogeneration. Creation of energy production centres at medium - and large-sized hospitals. | | 0 | 2,137 |
| Percentage of buildings with improved energy classification | | 9% | 30% |
| No. of installations in swimming pools | | 107 | 285 |
| No. of installations in sports premises | | 266 | 710 |
| No. of systems installed | | 938 | 2500 |
| Installed power (MW) | | 5.6 | 15 |
| No. of hospitals with cogeneration | | | 22 |

Measure E8M4 will be implemented in conjunction with the "Parque Escolar, E.P.E." (*Government Agency for Modernisation of Secondary Schools* ).

5.1.1.1 - Energy Certification of State Buildings Measure

a) Description

The activity in question aims to encourage the process of energy certification in State buildings, so that they may serve as an example to other types of buildings.

b) Objective

To achieve in 2015, through implementation of the measure, an economy of 16,401 toe, that is, a reduction in consumption of 5% when compared with the final energy consumption of 318,000 toe recorded in 2005.

c) Impact

The assumptions used in calculating the impact of the measure are based on the following factors:

. The basis of incidence will be 65%, which represents the proportion of air conditioning, ventilation and DHW in the energy consumption of service buildings. The average potential of the measure of 30% constitutes an average reduction in energy consumption resulting from the proposed intervention in new buildings and upgrades carried out on the existing stock.

. The technical applicability to the segment of 95% of buildings indicates the potential that exists in the stock of buildings which can technically be certified, excluding from this scope buildings which due to their essentially historical nature may not be suitable for certification. Implementation in the sector considers that around 30% of State buildings upon carrying out the certification process implement Energy Rationalisation Plans which will result in buildings with a new higher energy class of B- or higher.

**5.1.1.2 – Solar Thermal in Swimming Pools**

a) Description

Installation of solar thermal systems for heating of DHW in pools and changing rooms operated directly by State services and organisations or in private swimming pools where there is an associated public service.

b) Objective

The objective of the measure is to install by 2015 in around 285 public pools (State - or privately-owned), which are technically able to receive these systems, solar thermal collectors.

c) Impact

By 2015 the economies generated will be of the order of 4,561 toe with interventions at the local, regional and national installation levels.

5.1.1.3 – Solar Thermal at Sports Premises measure

a) Description

Installation at sports complexes (changing rooms for sports halls and pitches etc.) of solar thermal collector systems for DHW.

b) Objective

To achieve in 2015 a penetration of the measure of approximately 80% at existing changing rooms which are technically capable of receiving such equipment.

c) Impact

By 2015, the economies generated at infrastructures managed by public services and bodies, including council-run, regional or national installations, will allow estimated economies of 1,576 toe from the intervention in around 700 installations.

#### 5.1.1.4 Micro-producer Schools Measure

a) Description

Installation of electrical energy micro-production systems in State schools, in coordination with the "Parque Escolar, E.P.E.".

b) Objective

Installation of approximately 2,500 electrical energy micro-production systems by 2015, in State schools with the technical viability for the purpose (solar, micro -wind or other utilisation).

c) Impact

The implementation of this measure will allow an economy in 2015 of approximately 1,613 toe, resulting from the installation of around 15 MW of power, in 2,500 schools identified as targets for the measure.

5.1.1.5 – Hospital Cogeneration Measure

a) Description

Creation of energy production centres at large- and medium-sized hospitals which guarantee endogenous production of electrical energy and heat to provide partial cover for the electrical and thermal needs of the hospital buildings in an economically viable manner.

b) Objective

By 2015, State hospitals, with the necessary technical viability, must have in operation 20 cogeneration systems, corresponding to approximately one fifth of the hospitals considered.

c) Impact

There are currently 130 State hospitals operating, which togethe r with the other health and associated centres, consume more than 31,000 toe, of which around 12,000 is for consumption of electrical energy, the remainder being energy from gas (natural and LPG) and other fuels (fuel and gas oil).

The measures proposed are aimed at economies of 2,137 toe in the reference year of 2015.

### 5.1.2 Transport Measure

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Transports
E8M6
Phasing-out of vehicles with CO2 emissions higher than a stated limit. State car fleet to have 20% low emission vehicles by 2015. Acquisition of vehicles subject to existing vehicle short list. Mobility plan for organisations with more than 500 workers in the same location.
676 1,765

Reduction in consumption 10%

a) Description

This measure is aimed at the introduction of energy efficiency concepts in transport, specifically at the renewal of the fleet with low emission vehicles, the phasing out of

vehicles with the highest $CO_2$ emissions and the creation of mobility plans for organisations with more than 500 workers.

b) Objective

The proposed intervention is intended to have an effect on around 12,000 vehi cles, in which a reduction in consumption of approximately 10% is envisaged.

c) Impact

The measures offer the potential for economies of 1,796 toe in 2015.

### 5.1.3 Green Procurement (Ecological Public Procurement) Measure

**National Energy Efficiency Acti on Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Green Procurement
E8M7
Introduction of energy efficiency criteria into the acquisition of equ ipment. Qualification of enterprises in competitions limited to entiti es with approved energy efficiency improvement plans. Procurement of new buildings for the State limited to buildings classed as efficient.

| | | | |
|---|---|---|---|
| | | | 1108 |
| % of the stock of equipment with improved efficiency | | | 10% |

a) Description

Centralisation of the process of purchasing of energy by State organisations through the use of an energy procurement agency, with the three areas of high energy consumption by the State, that is health, edu cation and General Government bodies and services, being the priority.

Introduction of energy efficiency criteria in the acquisition of equipment and buildings by selecting entities with approved energy efficiency improvement plans, consistent with the environmental guidelines defined or to be defined by the Portuguese Environment Agency, in conjunction with the Agência Nacional de Compras Públicas, E.P.E. (*National Public Procurement Agency* ).

b) Objective

By 2015, half of present electrical energy purch ases by the State must be centralised at a negotiating body, with the aims of achieving energy savings of at least 10%.

Priority will be given to the 500 largest consumers out of a total of 12,000 entities (15,105 electricity meters), which are responsibl e for more than 80% of State consumption (800 GWh/annum and approximately €70 million annual electrical energy spend).

c) Impact

The impact of this measure in 2015 is estimated at 1,108 toe, as a result of the implementation of an efficient stock of equipm ent equivalent to 10% of the total.

### 5.1.4 Efficient Public Lighting Measure

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2010 2015**

**Targets**
**Indicators Current 2010 2015**

Efficient public lighting

E8M8
Installation of flow regulators to guarantee improved energy efficiency in public lighting.
1,764 6,174

E8M9

Substitution of globes by equipment with a greater reflection capacity and requirement for lower power lamps

| | | |
|---|---|---|
| | 230 | 805 |

E8M10
Meeting of minimum energy efficiency requirements for new installations

| | | |
|---|---|---|
| | 893 | 3,126 |

E8M11
Phasing out of mercury vapour lamps from public lighting

| | | |
|---|---|---|
| | 814 | 3,258 |

E8M12
Substitution of lights and electronic ballast older than 10 years

| | | |
|---|---|---|
| | 2,003 | 5,340 |

E8M13
Traffic control systems, substitution of light sources in traffic and pedestrian control systems (LED technology)

| | | |
|---|---|---|
| | 60 | 1,507 |

| | | | |
|---|---|---|---|
| No. of lighting outlets subject to intervention | | 46,429 | 162,500 |
| No. of globes substituted | | 14,286 | 50,000 |
| No. of new installations | | 57,143 | 200,000 |
| No. of mercury lamps installed | 300,000 | 225,000 | 0 |
| Total number of lighting outlets | | 40,385 | 107,692 |
| No. of traffic lights with LEDs | 100 | 1,000 | 25,000 |

### 5.1.4.1 - Installation of flow regulators to guarantee improved energy efficiency in public lighting

a) Description

Improved energy efficiency of public lighting, through the installation of light flow regulators (LFR) in 12.5% of the existing lights. The technical potential for intervention in the public lighting sector is estimated in the following table:

| Supplementary activities | Applicability as a % of the stock |
|---|---|

| | |
|---|---|
| Use of Light Flow Regulators (LFR) | 20% |
| Use of electronically operated electrical auxiliary equipment for operation of the lamps (substitution of ferromagnetic ballast) | 30% |
| Maximum compatibility between the lamps and the electrical auxiliary equipment operating them (ballast and ignitor) | 15% |
| Substitution of power factor compensation capacitors after 30,000 hours (essential to reduce reactive power) | 15% |
| Use, in new installations, of capacitors with a nominal voltage of 400 Volts, minimising their deterioration through the occurrence of voltage surges | 20% |
| Maximum and exacting photometric adaptation (type and quality of reflectance and refractory characteristics of the lighting apparatus) | 20% |
| Maximum luminotechnical adaptation (geometrical characteristics of the distribution of lighting outlets, consideration of the luminotechnical standards) | 15% |
| Adherence to the applicable recommendations concerning luminotechnical indices | 100% |
| Definitive substitution of mercury vapour lamps, still installed, by sodium vapour lamps | 30% |

In night-time periods of reduced activity and when there is no risk of losing any of the functional and security characteristics of public lighting systems, it is intended to reduce the level of brightness whilst not limiting the reach of the lighting devices and ensuring an adequate feeling of security.

The measure will be included in an equipment substitution programme, implemented through Municipal Programmes for Energy Efficiency in Public Lighting, grouping municipalities together in blocks of 10 for intervention on a minimum of 2,000 lighting outlets each. It is envisaged that by 2015 the measure will have been implemented in all municipalities in which it is technically and economically viable.

b) Objective

Use of flow regulation equipment in national, regional or municipal public lighting will allow energy economies of the order of 30 to 40% through a reduction in the power input during periods of reduced activity.

c) Impact

It is estimated that the economy resulting from the installation of flow regulators could result in an economy in the year 2015 equivalent to 6,174 toe.

### 5.1.4.2 – Traffic control systems

a) Description

Substitution of light sources in traffic and pedestrian control systems, through the implementation of a measure for the substitution of incandescent lamps by maximum efficiency lamps based on LED (light emitting diode) technology. At present this type of lamp accounts for just 1% of the total traffic lights in operation.

b) Objective

The intention is to include under this measure, and by 2015, half of the approximately 50,000 traffic lights existing in the country as at 2005. This objective will allow a tenfold increase in the longevity of the lamps and a reduction of a fifth in the current energy consumption of these devices, as a result of unit reductions in consumption of 55W for an incandescent lamp to between 8W and 12W for an LED lamp.

c) Impact

The estimated consumption of the approximately 50,000 traffic lights existing in the country is 3,767 toe ([3]), approximately 3% of the total consumption by public lighting provided by the State.

The measure identified (substitution of 25 ,000 traffic lights) allows an energy economy of 1,507 toe to be obtained. This economy is achieved on the basis of the following assumptions:

Substitution of 50W incandescent lamps by equivalent LED technology lamps of 8W.
5-lamp traffic light systems (3 for vehicles and 2 for pedestrians).

Annual period of operation of each light: 8,760 hours/annum (24hx365 days).

## 6 - Behaviours Area

Changing energy consumption patterns at the domestic expenditure level in Portuguese society is an essential factor in achieving the energy efficiency targets and reduction in $CO_2$ emissions to which Portugal is committed. The central issue therefore arises on a social life level with the objective of inducing a change in consumer habits, which constitutes a very demanding challenge in terms of timescales and procedures.

In fact, the results of various studies carried out in our countries show that simple procedures for universal communication, such as media campaigns, are associated with high costs and very limited results which are not particularly long-lasting and are difficult to assess. That is to say, they are not likely to give rise to continuous processes for changing behaviours that are progressively more effective and better targeted and, as a result, also capable of achieving improved results at ever lower costs.

From this perspective, the approach to social behaviours seeks to integrate three lines of activity:

. An adequate characterisation of the frame of reference relating to the most relevant of the various energy behaviour patterns of the Portuguese and its relationship with the respective knowledge and information frameworks.

. The definition of the strategic lines of a communications plan, identifying strategic target groups, appropriate types of content , specific chains of communications and identification of the preferred means, places and situations for circulation of the contents.

. Linking with the economic instruments and administrative procedures that it is decided to apply to the various sectors of energy consumption.

With regard to the characterisation of the social behaviours, a fairly broad initial survey has been carried out of the studies performed in our counties in recent years on the consumption of energy, as well as of the models that ha ve been used to influence the behaviours of individuals in this respect.

The studies considered to be most relevant were the subject of an in -depth analysis, centred on the following strategic dimensions: the role played by social variables (age, sex, income level, education, socio-professional category, size of home); the role played by information and knowledge in the predisposition to change; the methods applied in other socio-cultural contexts with a view to changing behaviours in relation to the promotion of greater energy efficiency; and the role of the State and the principal agents involved. Consideration was also given to a number of thoughts on linking the theme of energy with other environmental themes or areas that interface with certain target groups.

Secondly, existing studies were identified and analysed specifically in terms of the Portuguese situation along with the Eurobarometers dedicated to energy matters. A brief analysis was also performed of the projects relating to environmental educ ation in Portuguese schools, using a recent study that surveyed these.

On the other hand, the intention was also to carry out a survey of recent national and international communication campaigns on energy matters directed at residential consumers.

Taking these analyses as a basis, it was possible to move on to a second phase, which set out the strategic lines of a communications plan covering, on the basis of the definition of specific objectives, the identification of target groups and the selection of communications methods to be considered for each communications target group.

## 6.1 – More Programme

A programme aimed at publicising leading behaviours and technologies, as well as revealing cases of excellence, as a way of increasing awareness of efficient behaviours.

Five action areas have been defined, referred to as Medidas Mais (*More Measures*), meaning "more" efficiency, each of which has a direct impact on the following sectors that are the object of Directive 2006/32/EC of the European Parliament and of the Council, of 5 April 2006.

Objective

Programme with a twofold aim: firstly to publicise and provided information on leading technologies and secondly to highlight cases of excellence in order to raise awareness of the issue of energy efficiency and to encourage the various agents (mainly those that are most dispersed and difficult to reach with the mandatory schemes) to follow the example by way of "competition" between partners

Casa Mais (*Home*)

*Mais Eficiência* (More Efficiency) prize
Annual prize for excellence in the areas of energy efficiency

Energy certification of A or above
- Thermal insulation
- Efficient windows

Equipment of A or above
Efficient lighting
Renewable energies in single and multiple family dwellings
Lighting in communal areas
- Presence detectors
- Efficient lamps

Escola Mais (*Schools*)

Information and awareness-raising campaign on the subject of energy efficiency

Renewable energy in schools

. Solar power for changing rooms, swimming pools, kitchens, lighting and equipment

Efficient lighting

Class A or higher equipment

Energy certification of B- or higher
Measure linked with the Eco-Schools programme

Autarquia Mais (*Municipality*)

Public lighting
- Mercury-free
- 20% flow regulators
- Compliance with regulations (NR 13201)
- 50% of traffic lights with LED/solar

Public buildings/services
- 20% B- or higher
- 20% of schools and 50% of sports complexes with renewables

Green procurement implemented

Transport
- 20% of fleet with emissions of < 110 g/km

Empresa Mais (*Enterprises*)

- 50% of offimatics (photocopiers, computers, etc.) of > A or A+
- 80% of non-administrative functions on laptops
- Promotion of meetings held by teleconferencing
- Flow regulators/presence detectors

Fleets
- Encouraging vehicles with average $CO_2$ emissions of less than 110 g (20% of fleet)

Contracting
- Use of efficiency criteria when selecting suppliers
- Preference for enterprises with approved improvement plans

Service/office buildings certified as A or higher

Equipamentos Mais (*Equipment*)

Extension of Top-Ten to other equipment

- Specifically, refrigerators
- Upright and chest freezers

Wider publicising of hybrid vehicles
- Adoption by reference users

Portal to publicise best practice

Casa Mais – measures aimed at the residential sec tor, linked with the *Premio Casa+*, in the context of the protocol between the Order of Architects and the Ministry of the Economy and Innovation.

Escola Mais – aimed at the private sector, but also with an impact in the State sector.

Autarquaria Mais - aimed at the municipal sector;

Empresa Mais – aimed at the tertiary sector.

Equipamento Mais – the most horizontal of the measures with an impact in the residential and tertiary sector.

Transportes Mais – horizontal across all areas of activity.

Parceiras Mais (*Partnerships*) – horizontal across the areas of activity with emphasis at the local level.

. Casa Mais
The objective of this measure is to develop the concept of the efficient home, achieved essentially through attitudes that promote energy saving s in the home by encouraging a set of more efficient social behaviours:

Implementing necessary and sufficient measures to classify dwelling as class A or above, where a certified property is concerned.

Substitution of energy-inefficient windows and frame s through minor and medium-scale remodelling measures.

Efficient insulation of walls and roofs.

Installation of cooking equipment of classes A+ and A++.

Installation of efficient lighting through the use of efficient technologies, specifically CFL, fluorescent tubes and presence detectors.

Investment in renewable energies, specifically solar thermal and biomass equipment.

Investment in centralised air conditioning systems.

. Escola Mais

This measure is aimed at exploiting the concept of the efficient school, by creating the *Escola Mais* prize to be awarded to schools that adopt at least four of the following five concepts:

Renewable energies installed and covering the energy needs of changing rooms, swimming pools and kitchens.
Efficient lighting installed.
Support equipment (specifically photocopiers and computers) of class A or higher.
Energy certification of B ¯ or higher.
School mobility plan.

The intervention will take place in conjunction with the “Parque Escolar, E.P.E.”.

. Autarquia Mais

Annual Autarquia Mais award to reward the best performance among the three hundred municipalities. The assessment criteria will be as follows:

a) Public lighting:

Phasing out of mercury vapour lamps; flow regulators in 20% of lamps; compliance with regulations (NR13201); LED traffic light systems with solar power.

b) Public service buildings:

Establishment of *Energy Efficiency Programme Contract* in order to achieve the objective of having at least 1/5 of buildings at B ¯ within the space of 10 years.

Implementation of programme contracts for the installation of renewables in 1/5 of schools and 50% of sports complexes.

Green procurement implemented in energy services and products.

c) Private buildings:

1/5 of the stock of buildings classified as B ¯ or higher.

1/5 of residential homes with renewable energies.

d) Transport:

Modal shift of 5% from private transport to public transport.

1/5 of passenger transport fleet with low $CO_2$ emission vehicles.

. Empresa Mais
Awarding of prizes or similar to recognise enterprises which each year implement the following programmes:

a) Equipment:

50% of offimatics (specifically photocopiers, computers) of class A+.
80% of non-administrative functions on laptops.
20% of meetings held by teleconferencing.
Flow regulators/presence detectors in industrial or service buildings.

b) Fleets:

Encouraging of vehicles with low CO2 emissions (20% of fleet).

c) Contracting rules:

Use of efficiency criteria in the selection of suppliers.
Preference for enterprises with approved improvement plans.
Horizontal energy efficiency plans across the enterprise.
Procurement of new buildings restricted to B - and higher.

. Equipamento Mais

Raising awareness of the concept of best in class for energy efficiency.

Increased awareness of vehicles with low $CO_2$ emissions.

Portal for publicising best practice.

. Transportes Mais

Eco-driving and urban mobility programmes with, in addition, consideration of direct contributions to modal shift.

. Parcerias Mais

Stimulating local public-private networks in order to involve the various agents of civil society from the local communities, by promoting patronage of energy and encouraging, specifically, the voluntary sector.

## 6.2 – Operation E

This programme, which was launched and implemented in 2007, is aimed at schools and young people identified not only as target groups in terms of changing behaviours in the long-term but also as influential players in the decisions taken by adults.

This programme may be broadened out to the national level, once its strategic role within the NEEAP has been redefined, as a function of the following objective: inducing

changes in the behaviours of individuals, at home and at work, based on the adoption of good practices in energy efficiency. Use of the private car, specifically the adoption of "eco-driving" practices will also be considered. However, all these programmes will have to be rethought and modelled as a function of the results and recommendations coming from the preliminary studies to be performed, as mentioned above, with the respective conclusions being reflected in the preparation and execution of information and awareness-raising campaigns among each of the target groups.

**National Energy Efficiency Action Plan**

**Programmes and Measures**
**Programme**
**Name of measure**
**Measure code**
**Description**

**Impacts (toe)**
**Intermediate scenario**
**2015**

Operation E

Energy in schools
C10M1
Monitoring of energy consumption and publication of results ("energometers"). Conducting of information and awareness -raising campaigns among students and teachers. Energy "Open week". Green campus. Renewable energy in schools

Energy in transport
C10M2
Eco-driving. "Eco-driving" content in driving schools. Campaign of tips for more efficient driving.
35,956

Energy in the home.
C10M3
Information and awareness-raising campaigns on energy topics. Energy efficiency portal. Network of information points.
35,142

Energy at work
C10M4
Information and awareness-raising campaigns on energy topics: lighting, heating of areas, etc.
22,734

'15th salary campaign'
C10M5
Information on the sums it is possible to save each year

. Energy in Schools

By way of example, activities may include conducting a programme such as Energy in Schools. From this perspective, acknowledging the role of education in changing the behaviours of individuals, the implementation is proposed of a programme based on information and awareness-raising campaigns aimed at schools and, in particular, at young people of school age.

Target group: Schools – boards of governors, teachers, pupils, parents, families and the wider community.

Main message: to reward effort ("Your energy is our energy").

. Energy in transport

In addition to the decisions that a consumer takes when choosing a car to drive he is also responsible for the consumption of fuel by this vehicle when in use. The adoption of efficient or driving measures or "eco-driving" or simply rationality in the use of vehicles leads to significant reduction of energy consumption in transport.

In addition to campaigns among the general public on good energy efficiency practices in the use of vehicles or "eco-driving" campaigns aimed at professional drivers, an education campaign will also be developed with the following characteristics:

Target group: Driving schools – young people aged 16 and over

Main message: establish efficient driving habits and practices

. Energy in the home

The squandering of resources, rising energy prices and the threat of climate change are playing an increasingly pivotal role in the adoption of energy efficiency measures. However, the need for credible and continuous information is fundamental to the implementation of these. Therefore information and awareness-raising campaigns are an essential part of any energy efficiency programme.

The present programme will be linked with the creation of the Prémio Casa+, in the context of the protocol between the Order of Architects and the Ministry of the Economy and Innovation with the technical support of the Energy Agency.

## 7 – Taxation

The issue of taxation as a driver of energy efficiency is a clear and unequivocal aim of the present plan. Promoting access to and use of methods and equipment that are more efficient, by means of fiscal incentives, through direct or indirect taxation, using tax allowance or reduction mechanisms, or tax relief and deductions, are clearly ways to accelerate energy efficiency in consumption.

Objective

Use of fiscal tools (taxes, tax allowances, benefits and incentives) aimed at encouraging the purchase of equipment and materials that are more energy efficient and which at the same time act as a disincentive to purchase equipment that is less efficient than the better alternatives freely available in the market.

IRS

Awarding of 10% of the benefits associated with housing credit for Class A/A+ buildings

Tax benefits for expenditure on micro-production and solar thermal

. Tax relief on 30% of investments subject to a limit of €777

IRC

Accelerated writing off against tax for investments in energy efficient equipment

Vehicle Tax and Road Fund Licence ( [2])

Reduction in tax on the purchase of a new small car when scrapping an old one

. Review and simplification of the scheme for awarding the incentive

Partial substitution of ISV by IUC and environmental component in IUC

Incorporation of the $CO_2$ emission factor in calculation of ISV

Hybrid vehicles with -50% ISV

ISP

Industry
. Exemption from ISP for enterprises in the PNALE and with Energy Consumption Rationalisation Agreements
. Review of the ISP as a function of the content of $CO_2$ versus natural gas

Measures provided for in the PNAC

Buildings

Progressive alignment of taxation with the energy certification of buildings:

. Awarding of 10% of the benefits associated with housing credit for Class A/A+ buildings already provided for in the national budget 2008

### 7.1 – Personal Income Tax

. Additional tax deductions for energy efficient buildings or units therein

Measure to encourage homes with sustainable energy, through granting an additional allowance of 10% on the maximum authorised repayment amount plus annual interest under a loan agreement entered into for the acquisition of residential buildings or units with energy classifications of A or A+ in the System of Energy and Internal Air Certification (measure provided for in the national budget 2008).

. Tax deductions for investment in energy micro -production.

Tax relief/deduction in a sum equivalent to 30% of the investments made in the acquisition of electricity or thermal micro -production units with a maximum value that is updated annually.

### 7.2 – Corporation Tax

Definition of a scheme of accelerated depreciation for investments in highly energy - efficient equipment.

### 7.3 – Car Taxation

Additional tax incentive for the acquisition of new vehicles that result in the scrapping of a car of more than 10 years of age.

Gradual exploitation of the environmental component of car taxation (ISV and IUC). Hybrid vehicles with a 50% reduction in ISV.

### 7.4 – Tax on Petroleum Products

Exemption from the Tax on Petroleum Products (ISP), for companies with Voluntary Energy Consumption Rationalisation Agreements. Gradual exploitation of the environmental component of ISP, with incorporation of the $CO_2$ emission factor in the calculation of the rate of taxation.

## 8 – Incentives and Finance

The NEEAP will have public financing drawn from two area s, the Energy Efficiency Fund to which taxes on consumption and the efficiency incentive or tariff mechanism will simultaneously contribute and the sums allocated via the National Strategic Reference Framework (QREN) .

The sums will be applied in a number of specific areas: Innovation, Industry, Energy Service Companies (ESCO), Efficiency Cheque and Renove+ plan, Efficiency Loans, State Energy Audits, Communication and Coordination .

Financing of the present plan with sums originating from the Portuguese Carbon Fund may also be a possibility in relation to the NEEAP measures over and above the PNAC.

Sources of finance
Incentives and application of resources

Lamps tax / DGEG
Efficiency Incentive
QREN
Total

Traffic Management Platform (Innovation)
Industry QREN
ESCOs QREN
Efficiency Cheque / Renove+
Efficiency Loans and Efficiency Contract Insurance
State Audits
Premium, Communication and Coordination

Energy Efficiency Fund

Note: Does not include tax incentives
Source: ADENE/DGEG Analysis

### 8.1 – Incentives

#### 8.1.1 – Incentives for urban rehabilitation

Given that the building stock has enormous potential for energy efficiency in buildings, since around one third of homes are lacking in any kind of intervention in the area of rehabilitation, the present plan sets up three measures to encourage sustainable rehabilitation: the Efficient Windows measure, the Thermal Insulation measure and the Green Heat measure (measures provi ded for under point 3.1.3 of the present plan).

The measures identified will be brought together under two incentive systems to be arranged: the Efficiency Loans and the Efficiency Cheque.

#### 8.1.1.1 – Efficiency Loans Incentive

Subsidised personal loan to finance energy efficiency measures providing for a reduction of up to 50% in the lending rate charged to customers by the banking institutions.

. Agreement with financial institutions on subsidising lines of credit intended to finance energy efficiency investment measures.

These loans must be used solely for high energy efficiency products, included in a list to be published by means of an order from the minister responsible for the monitoring and results of the present plan.

#### 8.1.1.2 Efficiency Cheque Incentive

Premium in the form of an Efficiency Cheque to be awarded to low voltage domestic consumers who, in two consecutive years, show effective reductions in electricity consumption, by means of the following simplified mechanism:

. Incentive valued at 10% of the total amount spent on electricity in the previous calendar year (excluding levies, standing charges and taxes), where reductions in annual consumption for the immediately preceding two years of 10% or more are demonstrated.

. Incentive valued at 20% of the total amount spent on electricity in the previous calendar year (excluding levies, standing charges and taxes), where reductions in annual consumption for the immediately preceding two years of 20% or more are demonstrated.

#### 8.1.1.3 – Renove+ Programme

Measure to encourage renewal of the stock of domestic electrical equipment with low energy efficiency.

The financial benefit to be provided for the purchase of high energy efficiency domestic electrical equipment will be subject to such purchase coinciding with the surrender to the recycling bodies of the respective old equipment.

#### 8.1.1.4 – Boosting of Energy Service Companies (ESCO)

Boosting of ESCOs by use of competitions and strong incentives to set up Energy Service Companies, under Efficiency Contracts aimed at providing a legal framework for the relationship.

The aim is to provide a strong incentive for the creation of a sector that is fundamental to boosting energy efficiency, through the creation of enterprises that invest in energy

efficiency and are able to set up contractual relationships between energy marketing companies and final consumers, be these private, corporate or State.

| | | Incentives to set up ESCOs | Efficiency Contract | Efficiency Loans |
|---|---|---|---|---|
| State | Efficiency competition – State<br>€2 M/annum for ESCOs:<br>. Audits and certifications<br>. Financing of measures with efficiency contract | Competitions for setting up ESCOs based on the System of Incentives for Innovation of the QREN<br><br>. Framework for Order 1464/2007<br><br>. Notice for qualified entrepreneurship in energy services<br><br>. Annual notices with a ceiling of €5 m/annum | Contract regulated by government order (1)<br>. Mandatory for the State<br>. Channelling between 50 and 75% of reductions in billings to an independent account (ESCO)<br>> Versus average bill for previous years<br>. over 3 to 5 years | Accessible to ESCOs<br><br>(Including implementation of measures for the State) |
| Private individuals | PPEC(2)<br>Energy efficiency measures competition<br>. €10 M/annum for the electricity sector<br>. To be extended to other energy sources (3) | | Available to individuals and ESCOs<br><br>Includes "insurance"<br>- 50% of the loss between the investment of the ESCO and the Contract gains covered by the Energy Efficiency Fund<br>- €1 to 2M/annum | |

(1) Under Article 33 of Decree -Law No. 172/2006.
(2) Plan for the Promotion of Efficiency in Electricity Consumption (ERSE)

(3) Scope and eligibility criteria dependent upon the scope and criteria for internal measures under the Portuguese Carbon Fund

## 8.2 – Sources of Finance

### 8.2.1 – Taxes on Consumption

The Energy Efficiency Fund to be set up under the powers of the Ministry for the Economy and Innovation, to provide a framework, in particular, for the NEEAP, will have in these two types of taxes a source of finance equivalent to €6 million per annum:

. Tax on electricity consumption, also referred to as DGEG tax.
. Tax on low energy efficiency lighting/la mps, in accordance with the specific legislation recently published.

### 8.2.2 – Efficiency or Tariff Incentive

Incentive relating to the tariff system for the m arketing of electricity to low voltage consumers, in contracts for the first home of permanent residence of a non-seasonal nature, to be framed as a function of the requirements to be defined in conjunction wit h the Energy Services Regulatory Body (ERSE).

. Tariff reduction
The envisaged incentive provides that customers with annual consumptions of less than 2,000 kWh per annum qualify for a reduction in the marketing tariff of 2.5% of the contracted value for the immediately preceding year.

. Tariff increase

Customers with annual consumptions in excess of 4,000 kWh are liable for a tariff increase of 5% on the contracted value in the reference year. This process excludes large families or residential units wi th a high energy efficiency classification, classes A or A+ under the System for Certification of Energy and Air Quality Within Buildings (SCE).

The difference between the reductions and said increases in tariff will allow an annual balance of €16 million to be obtained. Bearing in mind that the present financing comes from electricity consumption, it will be advisable for these sums to be channelled into measures that encourage energy efficiency in the consumption of electricity.

### 8.2.3 National Strategic Reference Framework

The structural funds provided by the European Union and managed by the QREN, will allow financing of the present plan to the tune of € 8 million. The process of regulation

will be defined following the process that has now been started and will in particular be framed within the Operational Programme – Competitiveness Factors.

## 9 – Impacts

The sums will be applied in various specific areas: Innovation, Industry, Energy Service Companies (ESCO), Efficiency Cheques and the Renove+ plan, Efficiency Loans, State Energy Audits, Communication and Coordination.

The plan envisages that energy savings of 9.8% will be achieved in 2015. This objective will allow the target set by Directive No. 2006/32/EC of the European Parliament and of the Council, of 5 April 2006, which establishes an improvement of 1% per annum until 2015, to be exceeded by around 20%, that is to say 8% for the accumulated period 2008 - 2015. This saving translates into a reduction of 1,792,000 toe, of which approximately 4,777 GWh will come from measures of an exclusively electrical nature.

The energy economies envisaged are spread across all the sectors of the Directive, but in absolute terms the greatest contributions will come from the Transport sectors , followed by Industry, Residential, the Tertiary sector and the State.

Transport
Residential and Tertiary
Industry
State
Overall impact
Renove Carro (cars)
Urban mobility
System of Energy Efficiency in Transport
Operation E
Renove Casa & Escritório (home and office)
System of Energy Efficiency in Buildings
Instant Renewables and Solar Programme
Operation E
System of Energy Efficiency in Industry
Retroactive Measures
Energy Efficiency of the State
Total

Source: ADENE/DGEG Analysis
Units: thousands of toe

The final energy consumption eligible for definition of the objective, resulting from the average consumptions in the years referred to, was 18,347,000 toe. It should be pointed out that this value includes the enterprises subject to the National Climate Change Plan (PNAC) and the National Emission Licensing Plan (PNALE) and forming part of the EU

emissions trading. Consumption that takes place under the name of non-energy petroleum, namely asphalts and oils and lubricants, are excluded.

The NEEAP thus envisages a considerable slowdown in the rate of growth in final energy consumption, when the economic model is analysed in high growth GDP scenarios (above 3% per annum), and this rate may even stagnate in low growth GDP scenarios (2% per annum).

Forecast change in final energy consumption for the business as usual scenario with a high rate of growth in GDP (unit: thousands of toe)

Average saving 1,792 ktoe

Forecast change in final energy consumption for a business as usual scenario with a low rate of growth in GDP (unit: thousands of toe)

Average Annual Growth Rate (TCMA)

Note: The values of savings shown include savings from micro-production and retroactive measures
Source: Energy Balances (DGEG); CEEETA; ADENE/DGEG Analysis

The energy intensity defined as an objective for 2015 will thus be 120 toe per million euros of Gross Domestic Product, in any of the macroeconomic growth scenarios defined.

In this way, the NEEAP will make a contribution equivalent to 11 toe per million GDP, thereby reducing the level that would be achieved in a business as usual scenario and which would be estimated at 129 toe. In this way in 2015 there will be convergence of Portugal's energy intensity with the current European energy intensity.

Forecast change in energy intensity in Portugal for a business as usual scenario assuming a high rate of growth in GDP

(toe per million euros at 2000 prices)

EU-27 average (2005)
Trend([1])

Forecast change in energy intensity in Portugal for a business as usual scenario assuming a low rate of growth in GDP

(toe per million euros at 2000 prices)

(1) With the implementation of energy efficiency measures
Note: preliminary figures
Source: Energy Balances (DGEG); CEEETA; ADENE/DGEG analysis

## 10 – Implementation and Monitoring

The implementation of the NEEAP assumes that an extended set of interactions will be created, in addition to work on regulation of measures and programmes, monitoring and results and the formulation of proposals for improvement involving the collaboration of various entities.

Plan
- Planning/approval of measures

Coordination
- Monitoring implementation of measures
- Monitoring/follow-up lists

Operational planning
- Operational planning of programmes

Portugal Efficiency 2015 => National Programme on Climate Change (PNAC)

DGEG — MAOTDR
APA
CECAC
ADENE

Residential and Tertiary — Industry
Behaviours
Energy Efficiency Fund

Transport — State
Taxation

1. In the case of ecological public procurement the APA must guarantee the respective monitoring in partnership with the National Public Procurement Agency.

In order to show the links between the various services and bodies coordinating the different programmes, a list is provided below of the entities responsible for operational planning of the respective programmes:

Equipment
- Transport
  1. Renove Carro
  2. Urban Mobility
  3. System of Efficiency in Transport
- IMTT/DGEG

Residential and Tertiary
  4. Renove Casa & Escritório
  5. System of Efficiency in Buildings

6. Instant Renewables and Solar Programme
DGEG/ADENE

Industry

7. System of Efficiency in Industry
DGEG/DGAE

State

8. E3: Energy Efficiency of the State
ANCP (National Public Procurement Agency)
/ ADENE / APA

Behaviours

Behaviours

| | | |
|---|---|---|
| 9. Mais Programme | 10. Operation E | ADENE |
| Taxation | | |
| 11. Green Taxation | | DGCI / DGAIEC |
| Incentives and Financing | | |
| 12. Energy Efficiency Fund | | DGEG / ERSE / DG Treasury |

Regulation of the plan will be the responsibility of the Ministry for the Economy and Innovation, in conjunction with the Ministries and services and bodies answering to it and with responsibilities in the areas of intervention of the measures authorised herein.

Monitoring of the implementation of the programmes and measures will be coordinated by the Directorate General for Energy and Geology (DGEG) and the Energy Agency (ADENE), in conjunction with the bodies to be designated by the Ministry for the Environment, Regional Planning and Regional Development , in its capacity as the coordinating/supervisory body for monitoring of the PNAC, and other ministries w ithin the areas of their respective powers.

Coordination of activities with the Agência Nacional de Compras Públicas, E.P.E. is also a basic requirement for the operational aspect of the present plan in the area of the State.

The Regional Energy Agencies must also play an important role in the local and regional operational planning of the programmes and measures with responsibility for boosting and promoting energy efficiency initiatives.

## Annex I

## List of abbreviations

EAMA – European Automobile Manufa cturers' Association
ADENE – Energy Agency
ANCP – National Public Procurement Agency
APA – Portuguese Environment Agency
EC – European Commission

EU ETS – EU Emissions Trading Scheme
CP – Portuguese Railways
DGAE – Directorate-General of Economic Activities
DGAIEC – Directorate-General of Customs and Special Taxes on Consumption
DGCI – Directorate-General of Taxation
DGEG – Directorate-General of Energy and Geology
E-FRE – Electricity produced from renewable sources
f-gases – Fluorinated gases
ERSE – Energy Services Regulatory Body
GHG – Greenhouse Gases
IA – Car Tax
IMTT – Institute of Mobility and Terrestrial Transport
INE – National Statistical Institute
MAODTR – Ministry for the Environment, Regional Planning and Regional Development
ML – Lisbon Metropolitan Transport Authority
MLM – Mondego light railway
MP – Porto Metro
MST - Tejo Metro Sul
n.a – Not available
GDP – Gross Domestic Product
pkm – Passenger kilometres
PNAC - National Programme on Climate Change
PNALE - National Emission Licensing Plan
Ktoe – Thousand tonnes of oil equivalent
RCCTE – Buildings Thermal Performance Regulations
REF – Reference scenario
REN – National Electricity Grid
RGCE – Regulation on Major Consumers of Energy
RSECE – Regulation on Building Air Conditioning Systems
tep – tones of oil equivalent
TI – private transport
tkm – tonne-kilometre
GVA – Gross Value Added
vkm – vehicle-kilometre

([1]) GDP calculated at constant prices for the year 2000.
([2]) Market studies: Data E, Barómetro Auto .
([3]) Sources: ADENE studies with information gathered by the Lisboa e.nova (*Municipal environmental and energy agency*).