NATIONAL ENERGY EFFICIENCY ACTION PLAN

Athens, December 2014

Pursuant to Article 24(2) of Directive 2012/27/EU

CENTRE FOR RENEWABLE ENERGY SOURCES (CRES)

TABLE OF CONTENTS

Foreword 7
Introduction 9
Overview of national energy efficiency targets for 2020 12
Assumptions of calculation models 13
Target setting 15
Final energy savings overview 16
Primary energy savings overview 20
Policy measures in implementation of the Energy Efficiency Directive 22
Horizontal measures 22
Energy efficiency obligation schemes and alternative policy measures (Article 7) 22
Energy audits and energy management systems (Article 8) 33
Metering and billing (Articles 9-11) 34
Consumer information and training programmes (Articles 12 and 17) 41
Qualification, accreditation and certification schemes (Article 16) 45
Energy services (Article 18) 47
Other horizontal measures to promote energy efficiency (Articles 19 and 20) 53
National fund for energy efficiency and financial and technical support (Article 20 of the Directive) 71
Energy efficiency measures for buildings 78
Review of the requirements under the recast of Directive 2010/31/EU 78
Building renovation strategy (Article 4) 79
Complementary measures to address the issue of the energy efficiency of buildings and appliances 94
Energy efficiency of buildings used by public bodies (Articles 5 and 6) 97
Buildings of the central public administration (Article 5) 97

Buildings of other public bodies (Article 5) 97
Purchase by public bodies (Article 6) 123
Energy efficiency measures in the industry 126
Key policy measures addressing the issue of energy efficiency in the industry 126
Energy efficiency measures in the transport sector 136
Key policy measures addressing the issue of energy efficiency in the transport sector 136
Promotion of efficiency in heating and cooling (Article 14) 158
Comprehensive assessment 158
Individual installations: cost-benefit analysis and results 164
Individual installations: criteria for exemptions from the obligation to carry out cost-benefit analysis of the utilisation of waste heat 164
Energy transformation, transmission, distribution and demand response (Article 15) 168
Energy efficiency criteria in network tariffs and regulation 168
Facilitating and promoting demand response 169
Savings resulting from all energy supply measures 169
ANNEX A: Annual report under the Energy Efficiency Directive 172
ANNEX B: Description of alternative policy measures 185
ANNEX C: Methodology for determining energy savings of individual actions 202

This National Energy Efficiency Action Plan for the implementation of national
energy efficiency improvement objectives for 2020, was based on
Annex XIV to Directive 2012/27/EU,

and was developed with the cooperation of:
the Directorate for Energy Policy and Energy Efficiency
the Secretariat-General for Energy and Mineral Raw Materials
the Ministry of the Environment, Energy and Climate Change (YPEKA)
and the Directorate for Energy Policy and Planning of the Centre for Renewable Energy Sources and Saving (CRES).

WORKING PARTY

CRES CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING

Tingas Kostas	Directorate-General for Energy Policy and Planning
Iatridis Minas	Energy Policy Analysis Department
Giannakidis Georgios	Analysis Laboratory for Energy Systems
Zarkadoula Maria	Environment and Transport Department
Zoidis Grigoris	Environment and Transport Department
Theophilidi Myrto	Market Development Department
Karamani Fotini	Energy Policy Analysis Department
Korma Efi	Market Development Department
Siakkis Filippos	Analysis Laboratory for Energy Systems
Tourkolias Christos	Energy Policy Analysis Department

Alexopoulos Dimitrios	Directorate for Renewable Energy Sources and Electricity
Papadogianni Ekaterini	Directorate for Renewable Energy Sources and Electricity
Athanasiou Dimitrios	Directorate for Energy Policy and Energy Efficiency
Yfantidis Kimon	Directorate for Energy Policy and Energy Efficiency
Gregoriadis Grigoris	Directorate for Energy Policy and Energy Efficiency
Komninou Elisabeth	Office of the Minister for the Environment, Energy and Climate Change

FOREWORD

The main axis of European energy policy is a firm commitment to the need to increase energy efficiency. The key objective is to reach the 20% primary energy savings target by 2020, compared with the forecasts of the business as usual (BAU) scenario.

In this context, the primary objectives of the 'Europe 2020' strategy include energy efficiency, safeguarding and creating jobs and ensuring smart, sustainable and inclusive growth. Energy efficiency is high on the European Union's (EU) list of priorities and may help to address the triple challenge of the current economic downturn, energy dependence and climate change.

While monitoring progress towards achieving this main target, substantial deviations were observed and it was deemed appropriate to update both the commitments and the mechanisms that should be implemented. As a result, in October 2012, the European Commission adopted the new Directive 2012/27/EU on energy efficiency with clear focus on achieving the overall energy efficiency target of reducing primary energy consumption by 20% by 2020. The requirement to amend Directive 2006/32/EC on energy services and to adopt the new Directive 2012/27/EU on energy efficiency was the result of the signs of divergence in achieving the target of Directive 2006/32/EC which were apparent from the National Energy Efficiency Action Plans (NEEAP I & II) already submitted by the Member States, and the need to update the legal framework for energy efficiency in the EU.

Directive 2012/27/EC came into force on 4 December 2012, repealing Directive 2006/32/EC and Directive 2004/8/EC on cogeneration, with a deadline for compliance of 5 June 2014. Progress towards the indicative energy savings target of 9% by 2016 under Directive 2006/32/EC is a benchmark in the context of Directive 2012/27/EU and is part of this National Energy Efficiency Action Plan (NEEAP).

This NEEAP takes stock of the progress achieved in improving energy efficiency through the implementation of policies, measures, market mechanisms, and research and development activities. It is in this context that strategy which is to be implemented to achieve the national energy savings target by 2020, is being developed.

Improving energy efficiency will contribute significantly to achieving the objectives set at national level and involves energy efficiency measures and investments in the building sector, industry and transport. These measures, as a whole, achieve a comparatively faster payoff than other energy consumption reduction measures and are the best indicator of the achieved energy saving per investment unit, taking into account the total life cycle cost of interventions.

A major advantage of such technological interventions is the fact that any future increase in the cost of conventional fuels is absorbed by the improvement of energy efficiency and therefore has no impact on the end-user's budget. Also, the implementation of successful end-use energy-saving measures reduces total energy demand, with multiplier effects both at a local and national level.

Meanwhile, the market for energy-saving and energy efficiency improvement technologies is expected to experience a high growth rate by 2020 in view of the expected establishment of a

package of measures and commitments on public and private sector building premises. Furthermore, triggering new market mechanisms such as energy performance contracting through energy service companies and voluntary agreements, will form a new business sector which could offset the impact of the current downturn and the decline in construction activity.

This 2014 NEEAP is the third NEEAP following two action plans already submitted in the years 2008 and 2011, and is the first NEEAP under Directive 2012/27/EU. In addition, it aims to ensure and monitor obligations under Directive 2006/32/EC, based on data and information on the energy efficiency measures that were included in previous EEAPs. This NEEAP includes measures already implemented as part of the previous plans, and also includes measures which have been proposed or planned for the first time and which are expected to be implemented in the near future.

Finally, each NEEAP is a useful policy tool for the country as it focuses attention on improving energy efficiency, and thereby facilitating economic growth and safeguarding jobs. It is an energy policy tool for the European Union, and is a useful part of generating aggregated and comparative results and helping to develop a common and effective European energy policy.

INTRODUCTION

This NEEAP spans both the previous Directive 2006/32/EC on energy end-use efficiency and energy services and the new Directive 2012/27/EU on energy efficiency. Therefore, this report includes a comprehensive presentation of both energy savings expected from the implementation of Directive 2006/32/EC, and the energy efficiency requirements which arise from the new Directive 2012/27/EU.

In particular, it provides information on measures already in place, and measures recently adopted or expected to be adopted in view of the requirements arising from the application of the Directive. Moreover, it presents the measures falling within the scope of the existing institutional and regulatory framework with a view to adopting policies, commitments and strategies in all areas of the final and primary energy consumption to improve energy efficiency.

The existing Law 3855/2010 (Government Gazette No 95, Series I, 23-06-2010) 'Measures to improve energy efficiency in end use, energy services and other provisions' establishes the framework necessary to promote energy saving measures in Greece, and also harmonises Greek law with Directive 2006/32/EC on energy end-use efficiency and energy services. Additionally, the national indicative energy savings target for 2016 was set at 9% of the average annual final energy reference consumption. This target served as a stepping stone towards more effective planning and the implementation of measures to improve energy efficiency.

As a result, total primary energy consumption showed a downward trend over the period 2007-2012, except for a slight increase in 2008. More specifically, primary energy consumption in 2012 amounted to 27.1 Mtoe (314.7 TWh), showing an increase of 0.5% compared with 2011, and a decrease of 11.8% over the period 2007-2012. Final energy consumption marked a similar, though more pronounced tendency. In particular, final energy consumption in 2012 amounted to 17.1 Mtoe (199.2 TWh) showing a 9.2% decrease compared with 2011, and a 22.4% decrease over the period 2007-2012.

This decrease in primary and final energy consumption is the result of both the implementation of energy saving measures, and the impact of the economic downturn on the Greek economy during that period. By way of illustration, the industrial and tertiary sector showed a decrease in gross value added, particularly during the period 2009-2012, when the effects of the economic downturn were felt in the real economy. Moreover, the disposable income of households appears to follow the continuing declining trend in gross domestic product, with the exception of 2007-2008, when there was a slight increase. In the period 2007-2012, the total reduction in the disposable income of households was 10.9%, and the total reduction in gross domestic product was 13.2%. In comparison with 2011, in 2012 there was a 3.9% partial reduction in the disposable income of households and a 7.1% partial reduction in the gross domestic product.

These findings were confirmed by the 2nd EEAP, drawn up in 2011, which determined that the interim target for energy savings in 2010 of 5.1 TWh (0.44 Mtoe), was exceeded both as a result of implementing the measures prescribed by the first EEAP, but also because of the economic downturn.

For this NEEAP, ODEX indicators were used to assess the energy efficiency of technological interventions without the influence of externalities (such as economic, weather conditions, etc.). These indicators are considered to separate the economic downturn from the total estimated savings in final energy. Total final energy savings resulting from the application of this methodology for 2012 are estimated at 8.7 TWh (0.75 Mtoe). Energy savings in the residential sector equal 0.8 TWh (0.07 Mtoe), in the transport sector 7.3 TWh (0.63 Mtoe) and in the tertiary sector 0.6 TWh (0.06 Mtoe).

Based on the above considerations, primary energy savings for 2012 were also determined. More specifically, primary energy savings after applying ODEX indicators were 11.2 TWh (0.96 Mtoe).

Directive 2012/27/EU on energy efficiency is expected to be harmonised in the near future. Several milestones laid down in this Directive have already been implemented, demonstrating the trend of compliance with the recommendations of this Directive.

The first milestone was the definition of the national energy efficiency target, as provided for in Article 3 of the Directive. The target was determined initially in the annual report on the implementation of Directive 2012/27/EU, which was submitted in April 2013. However, under this NEEAP, this target was updated to be consistent with the recently revised national energy strategy of the country up to 2030.

More specifically, the energy efficiency target set for 2020 is to achieve final energy consumption levels of 18.4 Mtoe. It was decided to base the target on final energy consumption taking account of the fact that this determines the requirements and demand for energy and, at the same time, the calculation models for predicting the development and evolution of the energy system used simulate final energy consumption more effectively.

Moreover, primary energy consumption in 2020 will amount to 24.7 Mtoe, whereas the energy intensity of primary energy consumption and the energy intensity of final energy consumption in the Greek economy in 2020 will be equal to 0.109 and 0.081 koe/€ respectively. The target for 2020 is derived from estimates of the development of both the Greek economy, and the implementation of measures, actions and programmes for improving energy efficiency, penetration of RES and achieving energy savings in final consumption and primary energy production.

Furthermore, the energy savings target for the period 2014-2020, as calculated under Article 7 of the Directive concerning the adoption of energy efficiency obligation schemes, is 3 332.7 ktoe (38.8 TWh) in total, out of which the total for all new annual savings is 902.1 ktoe (10.5 TWh). The intermediate periods for monitoring progress towards reaching the total energy savings target, as well as the new savings, are defined as the following periods:

(a) 2014-2015, during which the intermediate total energy savings target will be 300.7 ktoe (3.5 TWh), and

(b) 2016-2018, during which the intermediate total energy savings target will be 1.678.9 ktoe (19.5 TWh).

It was decided to meet the energy savings target exclusively by adopting appropriate equivalent policy measures to ensure energy savings among final consumers, without setting up an energy efficiency obligation scheme for obligated parties (retail energy sales companies and energy distributors). Finally, 18 policy measures were established to achieve energy savings among final consumers. The bodies responsible for implementing these measures are the competent public authorities, and their final beneficiaries are central and the general government, public and private sector businesses, as well as final consumers.

Under Article 5 on the exemplary role of public bodies' buildings, it was decided to renovate 3% of the total floor area of heated and/or cooled buildings owned and occupied by the central government without applying the alternative approach. Moreover, a list of heated and/or cooled central government buildings with a total useful floor area over 500 m2 was published.

Finally, Article 14 on the potential for the application of high-efficiency cogeneration and efficient district heating and cooling, specifies which facilities may be exempted from the obligation to prepare cost-benefit analyses.

Presented below is the entire set of policy measures that have either been implemented or are planned to be implemented, and which are expected to contribute to improving energy efficiency in accordance with the provisions set out in Directive 2012/27/EU.

REVIEW OF NATIONAL ENERGY PERFORMANCE TARGETS FOR 2020

Pursuant to Article 3 of Directive 2012/27/ EU on energy efficiency, each Member State is called upon to set an indicative national energy efficiency target for 2020, based on either primary or final energy consumption, primary or final energy savings, or energy intensity.

When setting the Greek national energy efficiency target for 2020 the following parameters were also taken into account:

- that energy consumption in the 28 EU Member States in 2020 should not exceed 1,483 Mtoe of primary energy or 1,086 Mtoe of final energy,
- the measures provided for in Directive 2012/27/EU,
- the measures which have been adopted and are still being adopted to reach the national energy saving targets described in Law 3855/2010 'Measures to improve energy efficiency in end use, energy services and other provisions' (Government Gazette No 95, Series A, 23-06-2010), as part of implementing Directive 2006/32/EC on energy end-use efficiency and energy services.

A key element of the process for setting the national target was the identification of critical parameters and measures that should be taken into account in order to assess the development of the national energy system.

Specifically, the procedure for calculating the national indicative target took into account both the conditions affecting the consumption of primary and final energy, and projections of how the basic factors in the Greek economy will develop up to 2020 and projections on the development of the energy mix, as these projections stand to date. To order to calculate the target, assessments were made of the evolution, up to 2020, of the economic efficiency of technologies which improve energy efficiency and the implementation of specific policies and actions in all energy sectors.

Moreover, in this context, the measures and actions described in both the first and second National Energy Efficiency Action Plan, and the corresponding targets and actions outlined in the National Action Plan for RES, were taken into consideration. The policy measures outlined in the report submitted to the European Commission in December 2013 under Article 7 of Directive 2012/27/EU were also incorporated.

The quantitative analysis of the scenario for setting the national energy efficiency target was made with the help of the TIMES, WASP IV and COST mathematical models.

The TIMES model is a 'bottom-up, demand-driven' energy optimisation model. It describes the entire energy sector of the country and, through specific assumptions about the evolution of the country's macroeconomic data, international energy prices, available energy technologies and the evolution of cost thereof as well as the course of implementation of measures for improving energy efficiency, it determines the combination of minimum cost technologies and energy types serving the useful energy demand under restrictions, such as the level of RES penetration, greenhouse gas emissions from the energy sector etc. Therefore, it is ultimately possible to simultaneously assess the energy and environmental policies on energy supply and demand.

The WASP model is used for a more detailed analysis of the power system. The WASP model indicates the least-cost power system to serve the expected electricity and power demand and ensure the economic viability of power plants.

Finally, the COST model is used for the chronological simulation of the power system operation. This model determines the load of power plants to ensure the smooth cooperation of RES plants with thermal power plants.

ASSUMPTIONS OF CALCULATION MODELS

The key assumptions on macro-economic and demographic data used in the calculation models for defining the national energy efficiency target, are presented in Table 1. Macro-economic data concern both the total and per capita GDP, and value added at a national level.

Regarding demographic data, Table 1 shows the evolution of key macro-economic and demographic figures for the years under consideration.

NATIONAL ENERGY EFFICIENCY ACTION PLAN

Table 1: Table of the key assumptions of calculation models.

Macroeconomic data	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP (million € in current values)	**219,659**	**206,368**	**192,954**	**185,429**	**186,542**	**191,951**	**199,054**	**206,020**	**212,613**	**219,629**	**226,438**
Annual rate of change of GDP (%)		-6.1%	-6.5%	-3.9%	0,6%	2.9%	3.7%	3.5%	3.2%	3.3%	3.1%
GDP per capita (€ in current values)	57,262	53,794	50,040	47,962	48,123	49,389	51,236	53,050	54,768	56,597	58,374
Added value (mil. € in current values)	184,513	173,349	162,082	155,760	156,695	161,239	167,205	173,057	178,595	184,489	190,208
Annual rate of change (%) of added value (%)		-6.1%	-6.5%	-3.9%	0,6%	2.9%	3.7%	3.5%	3.2%	3.3%	3.1%
Demographic data	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Population (thousand)	11,308	11,308	11,367	11,397	11,426	11,456	11,471	11,486	11,501	11,517	11,532
Annual growth rate (%)		0.00%	0.52%	0.26%	0.26%	0.26%	0.13%	0.13%	0.13%	0.13%	0.13%
Number of dwellings (thousand)	3,836	3,836	3,856	3,866	3,876	3,887	3,885	3,884	3,882	3,881	3,879

TARGET DEFINITION

The results from the application of the energy model for setting the national energy efficiency target led to setting 18.4 Mtoe of final energy consumption as the energy efficiency target for 2020. The target was set on the basis of final energy consumption, bearing in mind that the latter determines energy requirements and demand. In addition, the calculation models used for predicting the development of the energy system provide more effective simulations of final energy consumption. Additionally, pursuant to the guidelines of Directive 2012/27/EU, predictions for primary energy consumption and estimates of the energy intensity of the Greek economy in 2020, are also presented.

The target for 2020 is derived from the estimates of the development of both Greek economic figures, and the **implementation of measures, actions and programmes for improving energy efficiency**, penetration of RES and **achieving energy savings.** It is important to note that the estimates of final energy consumption for 2020, but also of primary energy consumption are significantly lower than those observed in 2007 (Table 2). It should also be noted that primary energy consumption for 2020 is expected to be even lower than that for 2011. In particular, significant improvements will be made to the energy development model, combining both its structural and technological characteristics, and in the functioning of the energy system at the level of primary energy production and energy demand management.

As a consequence of the impact of economic developments on the country's energy system, it is expected that there will be a remarkable improvement in the primary energy intensity indicator (Table 2). Specifically, in 2007, before the effects of the economic downturn were apparent, but also before measures to improve energy efficiency began to be implemented, the primary energy intensity indicator was approximately 0.137 koe/€. It is expected that, with steady growth in the Greek economy, the primary energy intensity indicator will see a 20.4% increase (i.e. lower than 0.109 koe/€) by 2020, reflecting the steady transition to an energy-efficient growing national economy.

The same trend of improving energy efficiency is also confirmed by the energy intensity indicator for final energy consumption (Table 2), which shows a decrease of 18.2% in 2020 (0.081 koe/€) compared to 2007 (0.099 koe/€).

Table 2 summarises the development of the energy figures and energy intensity indicators under consideration, giving outturn data for the years 2007, 2009 and 2011, and the corresponding estimates for 2020, as resulting from the national indicative targets set under Directive 2012/27/EU.

Table 2: Evolution energy figures and national indicative target.

	2007	2009	2011	2020 (National indicative target under Directive 2012/27/EU)
Gross inland energy consumption (Mtoe)	31.5	30.5	27.8	25.4
Primary energy consumption (Mtoe)	30.7	29.6	26.9	24.7
Total final energy consumption (Mtoe)	22.1	20.5	18.9	18.4
Energy intensity of primary energy consumption (koe/€)	0.137	0.128	0.129	0.109
Energy intensity of final energy consumption (koe/€)	0.099	0.089	0.091	0.081

REVIEW OF FINAL ENERGY SAVINGS

In preparing the first EEAP, an extensive study was carried out to identify all the factors that will contribute to the implementation of Directive 2006/32/EC on energy end-use efficiency and energy services.

In this way an integrated national energy efficiency improvement programme was created, the implementation of which was to lead to the achievement of the interim energy target for 2010. The measures of this programme have been arrived at by taking account of the existing energy situation per sector of activity, national priorities (further penetration of natural gas and RES) and the policies and measures to which Greece is committed and which it is implementing at European and global levels in relation to the choice of energy mix, environmental commitments and obligations and employment and social cohesion.

As confirmed by the 2nd EEAP, the interim target for energy savings in 2010 was exceeded by implementing measures prescribed by the 1st EEAP, but also as a result of the economic downturn.

Table 3 shows the final energy savings achieved in 2012, resulting from the calculation of ODEX indicators, as well as the aggregated energy savings targets which arose from the 1st EEAP.

Table 3: Energy savings estimates and individual targets.

	Final energy		
	ESD		EPBD
	Energy savings target as set out in the 1st EEAP (TWh)	Target achievement for 2012/forecast for 2016 (TWh)	Target for nearly zero-energy consumption buildings (all new buildings, rate (%) or extension of requirements for energy performance)
2010	5.15		
2012		8.74	
2016	16.46	16.46	
2020			100%

The ODEX indicators methodology was used to assess energy savings for 2012.

As part of preparing the 2nd EEAP and in order to take account of the significant impact of the economic downturn on all human activities, a methodology to give an approximate valuation of its impact on energy consumption was developed. This methodology was based on the effort to adapt the estimated final consumption by sector in 2010 (submission of 2nd EEAP) to the levels that might have existed without the impact of the economic recession. This was achieved by calculating the ratio of specific indicators for 2007, which is considered as the reference year, and 2010.

For this NEEAP the ODEX indicators, as calculated under the European project ODYSSEE-MURE (Energy Efficiency Trends & Policies), were used with the intention of disassociating the estimated energy consumption from the overall reduction in energy savings due to externalities, including the economic downturn. The ODEX indicators are used to measure energy efficiency in the main sectors of energy consumption (industry, transport, residential sector), and in final consumption as a whole.

For each final consumption sector, the ODEX indicator, as defined in Ministerial Decision No Δ6/7094/23-05-2011 (Government Gazette, Series II, No 918) (Article 4, Calculation methods - addressing uncertainty) is calculated as a weighted average of the individual industrial sectors, end uses in the residential sector and various transport categories. The weighting factor used to calculate the weighted indicator relates to the percentage of energy consumption in the total energy consumption in the sector which is accounted for by each sub-sector. The individual indicators are calculated using the change in unit consumption, which is determined by taking physical quantities into account, to reflect the improvement of energy efficiency in terms of valuation of energy policy measures. The ODEX energy efficiency indicators are considered more representative in assessing energy efficiency than traditional indicators because they are normalised, and not influenced by parameters that determine energy efficiency, but are not related to it, including changes in the economy (e.g. economic downturn) and industry (e.g. structural changes in production processes), changes in lifestyle (increase in the size of dwellings, changes in the number of vehicles in circulation), etc.

To overcome the problem that the ODYSSEE-MURE programme does not specify the ODEX indicator for the tertiary sector, a corresponding indicator was developed. This was calculated from the results of the energy models used to assess the development of the energy system and the improvement of energy efficiency in the future (see Chapter 'Overview of national energy efficiency targets for 2020').

More specifically, the reduction in consumption and the improvement of the actual energy efficiency in the tertiary sector was calculated using the following functions:

$$qef = (Qt-Qo) \cdot (Eo/Qo)$$

and

$$uef = Qt \cdot (Et/Qt - Eo/Qo)$$

where

Qt and Qo are the usable energy in the years t and o respectively, and

Et and Eo is the energy consumption in the years t and o respectively.

It should be noted that modelling of the ODEX indicator for the tertiary sector was carried out from 2010 onwards, and therefore the improvement in energy efficiency for the period 2007-2010 is not determined. However, considering that the methodology used in the previous NEEAP did not lead to energy savings in the tertiary sector, the results from the application of this approach are not expected to vary.

Table 4 lists the results obtained from the application of the above methodology regarding the energy savings achieved in the period 2007-2012 for all the final consumption sectors concerned.

Table 4: Energy savings assessments per sector in 2007-2012

Sector	Energy savings achieved in 2010 (TWh)
Residential	0.8
Tertiary	0.6
Industrial	0.0
Transport	7.3
Total	8.7

As shown in the table above, energy savings equal 0.8 TWh (68.3 ktoe) in the residential sector, 0.6 TWh (55.3 ktoe) in the tertiary sector and 7.3 TWh (627.6 ktoe) in the transport sector. In this case, the total energy savings are estimated to be equal to **8.7 TWh** (751.2 ktoe). Finally, this methodology led to the conclusion that energy efficiency in the industrial sector did not improve in the period concerned.

It is established that the intermediate energy savings target set by Law 3855/2010 for the year 2010 was met, and it appears that it is possible to meet the overall target for the year 2016.

OVERVIEW OF PRIMARY ENERGY SAVINGS

The indicative target set in accordance with Article 3 of Directive 2012/27/EU relates to the final energy consumption for 2020, as presented in detail in section 2.1 of this study. Primary energy savings are not taken into account in setting the target.

This section presents the evaluation of primary energy savings for 2012, taking into account final energy savings, as presented in detail in section 2.2, and the rates for converting final energy into primary energy (Decision No Δ6/Β/οικ. 5825/30.03.2010 (Government Gazette, Series II, No 407 'Adoption of Regulation on the Energy Performance of Buildings', Table B1).

In the case of the final consumption sectors concerned, the distribution of the energy savings between electricity and petroleum products is derived from the percentage participation of these energy products for 2012. In the industrial sector, for example, based on the energy balance for 2012, the final consumption of petroleum products stands at 1,076 ktoe (12.5 TWh) and electricity consumption at 995.1 ktoe (11.6 TWh). This means that in the evaluation of primary energy savings, 52% is considered to relate to petroleum products and 48% to electricity products.

Table 5 presents the conversion factors used and associated with the savings ratio used for evaluating final energy savings in Section 2.2.

Table 5: Data for the calculation of primary energy savings.

Sector	Energy		Conversion factors for converting final energy into primary energy	
	Products Petroleum	Electricity	Products Petroleum	Electricity
Residential	54%	46%		
Tertiary	23%	77%	1.1	2.9
Industrial	52%	48%		
Transport	100%	0%		

Based on the above and considering the final energy savings for in 2012, the primary energy savings achieved in 2012 are presented in Table 6.

Table 6: Primary energy savings assessments per sector in 2012.

Sector	Primary energy savings (TWh) ODEX indicator
Residential	1.5
Tertiary	1.6
Industrial	-
Transport	8.0
Total	11.2

As shown in the table above and in accordance with the ODEX indicators, the minimum primary energy savings equals to 1.5 TWh (131.6 ktoe) in the residential sector, 1.6 TWh (137.5 ktoe) in the tertiary sector and 8.0 TWh (690.4 ktoe) in the transport sector. In this case, the total energy savings are estimated to be equal to **11.2 TWh** (959.5 ktoe).

Finally, no additional targets for energy efficiency have been designed or planned.

POLICY MEASURES FOR THE IMPLEMENTATION OF THE ENERGY EFFICIENCY DIRECTIVE

HORIZONTAL MEASURES

ENERGY EFFICIENCY OBLIGATION SCHEMES AND ALTERNATIVE POLICY MEASURES (ARTICLE 7)

I. Calculation of the overall energy savings target

Pursuant to Article 7(1) of Directive 2012/27/EU, the energy savings target calculation *'shall be at least equivalent to achieving new savings each year from 2012/27 January 2014 to 31 December 2020 of 1.5 % of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three-year period prior to 1 January 2013. The sales of energy, by volume, used in transport may be partially or fully excluded from this calculation'.*

The total final energy consumption in 2010, 2011 and 2012, as well as its distribution between the final consumption sectors are presented in Table 7, in accordance with the final energy balances given by the Ministry of Environment, Energy and Climate Change and Eurostat.

Table 7: Final energy consumption in the three-year period 2010-2012 (Source: Eurostat).

Final energy consumption (ktoe)	2010	2011	2012
Industry	3 471	3 323	2 998
Transport	8 158	7 446	6 380
Other sectors	7 373	8 104	7 751
Total of sectors	**19 003**	**18 873**	**17 129**

It is noted that, in calculating the final energy consumption which is used to identify the target under Article 7, final energy consumption in the transport sector is excluded.

Moreover, since the target to be achieved refers to the annual sales of energy, by volume, to the final consumers, the quantities of RES which are not for sale are also excluded from the final energy consumption calculation (Table 8). Specifically, the exclusion concerns charcoal and solid biomass. During the period 2010-2012, 21.1% of the biomass used was consumed without the quantities in question having been sold, whereas the remaining percentage was sold.

Table 8: Final energy consumption in the three-year period 2010-2012, which is generated from RES and is not for sale (Source: Ministry of Environment, Energy, and Climate Change, Eurostat, General Directorate of Forest Protection, ELSTAT, CRES).

	2010	2011	2012
Final RES energy consumption which is not for sale (ktoe)	381	439	460

The above estimates were drawn from combined data processed by CRES and came from:

- the General Directorate for the Development and Protection of Forests and the Natural Environment, with regard to the quantities of incompletely collected forestry residues which are distributed free of charge and
- the research into energy consumption in households conducted by the Hellenic Statistical Authority in the period 2011-2012 with regard to the number of households using biomass distributed free of charge to cover their heating needs.

Table 9 below gives the final energy consumption data used to determine the energy savings target for 2010, 2011 and 2012 pursuant to Article 7. The average energy consumption in the three-year period 2010-2012 is 10 580 ktoe.

Table 9: Final energy consumption in the three-year period 2010-2012 used in calculating the target.

	2010	2011	2012	Three-year period average
Final energy consumption (ktoe)	10 464	10 988	10 289	10 580

According to the above information and on the basis of Article 7(1) of the Directive, the energy savings target is equivalent to new savings of 158.7 ktoe per year (1.5% of the average final energy consumption in the three-year period, i.e. 10 580 ktoe) which amounts to total new annual savings of 1 110.9 ktoe in the period 2014-2020. The total energy saving for the same period is 4 443.7 ktoe cumulatively, as illustrated in Table 10.

Table 10: Energy savings required in the period 2014-2020 under Article 7(1) of Directive.

Year	Annual energy savings (ktoe)						Total	
2014	158 7	158 9						
2015	158 7	158 7						317 4
2016	158 7	158 7	158 7					476 1
2017	158 7	158 7	158 7	158 7				634 8
2018	158 7	158 7	158 7	158 7	158 7			793 5
2019	158 7	158 7	158 7	158 7	158 7	158 7		952 2
2020	158 7	158 7	158 7	158 7	158 7	158 7	158 7	1 110.9
Total								4 443.7

In calculating the energy savings target, Article 7(2) of the Directive is used to decrease the cumulative energy savings required by up to 25%, and specifically it was decided to combine the effects of:

- subparagraph (a) on applying a progressive energy savings rate (1% in 2014 and 2015, 1.25% in 2016 and 2017 and 1.5% in 2018, 2019 and 2020)
- and subparagraph (b) on excluding part of the energy sales used in industrial activities listed in Annex I to Directive 2003/87/EC from the calculation

until the maximum allowable decrease in required energy savings (25%) was reached.

More specifically, the maximum allowable decrease of 25% was reached by subtracting the energy equivalent of 557 ktoe which represents part of the heating energy consumption for industrial activities which fall within the scope of Directive 2003/87/EC from the average final energy consumption in the three-year period 2010-2012 (10 580 ktoe) which is used to calculate the target under Article 7. According to data received by the Office of Emission Allowances Trading of the Ministry of Environment, Energy and Climate Change, the heating energy consumption of the activities in question is approximately 700 ktoe.

The average final energy consumption in the three-year period 2010-2012 is: 10 580 - 557 = 10 023 ktoe.

Then, by applying the progressive energy saving rate (1% in 2014 and 2015, 1,25% in 2016 and 2017 and 1,5% in 2018, 2019 and 2020) to the final energy consumption (10 023 ktoe), the energy savings target for the period 2014-2020 is found, which is calculated cumulatively and amounts to 3 332.7 ktoe, out of which 902.1 ktoe represents the total new annual savings, as shown in Table 11 below.

It is noted that the cumulative target is 25% lower than that originally estimated.

Table 11: Energy savings target in the period 2014-2020 under Article 7(1) and (2) of Directive).

Year	Annual energy savings - ktoe							Total
2014	100 2							100 2
2015	100 2	100 2						200 5
2016	100 2	100 2	125 3					325 8
2017	100 2	100 2	125 3	125 3				451 0
2018	100 2	100 2	125 3	125 3	150 3			601 4
2019	100 2	100 2	125 3	125 3	150 3	150 3		751 7
2020	100 2	100 2	125 3	125 3	150 3	150 3	150 3	902 1
Total								3 332.7

The intermediate periods for monitoring the progress towards reaching the total energy savings target, and the new savings, will be:

(a) 2014-2015, during which the intermediate total energy savings target will be 300.7 ktoe;

(b) 2016-2018, during which the intermediate total energy savings target will be 1 678.9 ktoe.

II. Description of the national energy efficiency obligation scheme

It was decided to meet the energy savings target solely by adopting appropriate equivalent policy measures to ensure energy savings among final consumers, without setting up an energy efficiency obligation scheme for obligated parties (retail energy sales companies and energy distributors).

Policy measures to achieve energy savings among final consumers are implemented by the competent public authorities and the final beneficiaries are the central and the general government, public and private sector businesses, as well as the final consumers.

III. Description of alternative policy measures

The policy measures selected cover all final energy consumption sectors including the residential, tertiary and transport sectors, as well as the industries which fall within the scope of Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 1996/61/EC.

Table 12 lists the alternative policy measures selected to meet the obligations arising under Article 7.

It is noted that the energy savings resulting from policy measures M1, M2, M3, M12 and M14 contribute to the total target under Article 7 from 2011, due to the ability to count them up to 3 years later, as set out in Article 7(7).

The total volume of final energy savings (ktoe) due to the policy measures is estimated to be 902 1 ktoe.

Table 12: Selected alternative policy measures.

S/N	Policy measures to save energy	Number of interventions	Implementation period of the measure	Lifetime of the measure	Calculated final energy savings (ktoe)
M1	'Save Energy at Home' programme	70 000 dwellings	2011-2015	2014-2024+	83.8
M2	'SAVE' Programme for Local Authorities	104 municipalities	2011-2015	2014-2024+	3.7
M3	'SAVE II' Programme for Local Authorities	139 municipalities	2011-2015	2014-2024+	8.3
M4	Energy upgrade of residential buildings	200 000 dwellings	2015-2020	2014-2024+	239.5
M5	Energy upgrade of public buildings	280 public buildings	2015-2020	2014-2024+	12.8
M6	Energy upgrade of commercial buildings	3 500 buildings	2015-2020	2014-2024+	31.6
M7	Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard	4 000 buildings	2015-2020	2014-2024+	28.1
M8	Energy upgrade of commercial buildings through Energy Service Companies	3 000 buildings	2015-2020	2014-2024+	50.8
M9	Education and training actions for tertiary sector staff	40 000 individuals	2015-2020	2014-2024+	76.8
M10	Developing smart metering systems	60 000 meters 160 000 meters 5 540 000 meters	2014-2015 2014-2016 2016-2020	2014-2024+	96.8
M11	Replacing old public and private light trucks	10 000 vehicles	2015-2020	2014-2024+	11.3
M12	Replacing old	50 000 vehicles	2011-2015	2014-2024+	22.7

	private passenger vehicles				
M13	Promotion of CNG and LPG-powered private passenger vehicles	35 000 vehicles	2015-2020	2014-2024+	10.4
M14	OPESD Operations		2011-2015	2014-2024+	14.2
M15	Thessaloniki Metro development		2017-2020	2017-2024+	21.4
M16	Extension of Athens metro		2013-2020	2013-2024+	29.3
M17	Offset of fines on illegal buildings with energy upgrades	90 000 dwellings	2014-2020	2014-2024+	107.8
M18	Energy managers in buildings of the public sector and the general government	15 000 buildings	2014-2020	2014-2024+	52.6
Total volume of final energy savings (ktoe) due to the policy measures					**902 1**

IV. Further information on energy efficiency obligation schemes or alternative policy measures.

A. Methodology for determining energy savings of individual operations

The methodology for determining energy savings achieved is analysed by policy measure in Table 13.

Table 13: Methodology for determining energy savings by policy measure.

S/N	Policy measure	Methodology
M1	'Save Energy at Home' programme	Scaled savings
M2	'SAVE' Programme for Local Authorities	Scaled savings
M3	'SAVE II' Programme for Local Authorities	Scaled savings
M4	Energy upgrade of residential buildings	Scaled savings
M5	Energy upgrade of public buildings	Scaled savings
M6	Energy upgrade of commercial buildings	Scaled savings
M7	Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard	Projected savings
M8	Energy upgrade of commercial buildings through Energy Service Companies	Scaled savings
M9	Education and training actions for tertiary sector staff	Projected savings
M10	Developing smart metering systems	Projected savings
M11	Replacing old public and private light trucks	Projected savings
M12	Replacing old private passenger vehicles	Projected savings
M13	Promotion of CNG and LPG-powered private passenger vehicles	Projected savings
M14	OPESD Operations	Scaled or projected energy savings depending on the specifics of the operation
M15	Thessaloniki Metro development	Projected savings
M16	Extension of Athens metro	Projected savings
M17	Offset of fines on illegal buildings against energy upgrades	Scaled savings
M18	Energy managers in buildings of the public sector and the general government	Projected savings

B. Life cycle of policy measures to determine energy savings

The approach to be followed to determine energy savings achieved taking into account the life cycle of policy measures is the straightforward method whereby the actual energy savings for each individual measure are broken down by year from the date the was measure enforced until 31 December 2020.

C. Approach to avoid double counting of achieved energy savings

Table 14 presents the approaches to be adopted in order to avoid duplication of the impact of measures, thus double counting of energy savings achieved from the policy measures already implemented or to be implemented shortly.

Table 14: Approaches to avoid double counting of achieved energy savings from the policy measures.

S/N	Policy measures to save energy	Number of interventions	Avoiding double counting of achieved energy savings
	Residential sector		
M1	'Save Energy at Home' programme	70 000 dwellings	Implementing interventions in separate buildings.
M17	Offsetting fines on illegal buildings with energy upgrades	90 000 dwellings	
M4	Energy upgrade of residential buildings	200 000 dwellings	
	Public sector		
M2	'SAVE' Programme for Local Authorities	104 municipalities	Implementing interventions in separate buildings
M3	'SAVE II' Programme for Local Authorities	139 municipalities	
M5	Energy upgrade of public buildings	280 public buildings	
M14	OPESD Operations		
M7	Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard	4 000 buildings	If measures M2, M3, M5 and M14 are implemented in buildings where measures M7 and M18 are also implemented, energy savings will be calculated based on the new energy condition of the buildings
M18	Energy managers in buildings of the public sector and the general government	15 000 buildings	
	Tertiary sector		
M6	Energy upgrade of commercial buildings	3 500 buildings	Implementing interventions in separate buildings
M8	Energy upgrade of commercial buildings through Energy Service Companies	3 000 buildings	
M9	Education and training actions for	40 000 individuals	If measures M6

	tertiary sector staff		and M8 are implemented in buildings where measure M9 is also implemented, energy savings will be calculated based on the new energy condition of the buildings
	Transport sector		
M15	Thessaloniki Metro development		Valuation of measures M15 and M16 in these cities will be based on the new energy condition of passenger transport that will result from implementation of measures M12 and M13
M16	Extension of Athens metro		
	Cross-sectoral measures		
M10	Developing smart metering systems	5 760 000 meters	Valuation of measures aimed at energy upgrading of buildings will be based on the new electricity consumption to be determined after implementation of measure M10

ENERGY AUDITS AND ENERGY MANAGEMENT SYSTEMS (ARTICLE 8)

Law 3855/2010 has set the institutional framework for conducting energy audits. Pursuant to Article 14, energy audits shall be designed to identify potential energy efficiency improvement measures and shall be carried out in an independent manner, on all final customers, including smaller domestic, commercial and small and medium-sized industrial customers. Energy audits are conducted in accordance with the provisions of Joint Ministerial Decision Δ6/Β/οικ. 11038/1999 (Government Gazette, Series II, 1526, 08.07.1999) 'Procedures, requirements and guidelines for conducting energy audits' in order to achieve efficient and high quality services. This JMD defines the procedures, requirements and guidelines for energy audits on the facilities and areas of an industrial or building complex, and in general.

Energy audits under schemes based on voluntary agreements between interested bodies and public organisations are be carried out in accordance with the above requirements.

Moreover, no requirement has been adopted for large enterprises to carry out energy audits at national level [Article 8(4)], and no procedure has been established yet to ensure that large enterprises will carry out regular energy audits - including where appropriate in the context of voluntary agreements - at least every four years, with the first energy audit to be carried out by 2015 [Article 8 (4)-(6) of Directive 2012/27/EU). Additionally, the minimum criteria under which energy audits under Annex VI to the Directive will be implemented, and the way in which compliance with these minimum criteria will be ensured [Article 8(1) of Directive 2012/27/EU), have not been set.

The framework to be adopted for energy audits will be based either on ISO 50002 or EN 16247, which both define in detail the process of energy audits, taking into account the aforementioned JMD Δ6/Β/οικ. 11038/1999. More specifically, in standard EN 16247, Part 1 focuses mainly on the quality requirements to be observed and the key steps that must be taken in carrying out energy audits, whereas Parts 2-4 describe in detail the procedures to be followed when an energy audit is carried out on buildings, industrial processes and transport, respectively. Finally, Part 5 of the standard describes the knowledge and skills required for energy auditors.

Determination of the process for exempting large enterprises from the obligation to carry out energy audits in case when an energy or environmental management system is implemented, developing a certification and training system for energy auditors, and designing and implementing an audit and verification system for the energy audits carried out, is also pending.

Regarding the obligation to record the number of energy audits carried both as a whole, and on large enterprises, and the total number of large enterprises in the territory of the Member State and the number of companies to which Article 8 (5) (part 2.3.3. of Annex XIV to the Directive) applied, a specific information system is currently being developed.

More specifically, as part of the project entitled 'National information system for measuring energy efficiency under Directive 2006/32/EC', CRES, which is funded by the Operational Programme 'Digital Convergence', CRES will develop an information system to present:

(a) the total number of energy audits,

(b) the total number of energy audits carried out on large enterprises, and

(c) the number of large enterprises obliged to carry out an energy audit (register of obliged enterprises).

This information system will collect and process all this information on energy audits and large enterprises for each reporting period in which the national action plans are submitted. Thereby, it will contribute to the effective implementation and monitoring of the object described in Article 8 of Directive 2012/27/EU.

Regarding large enterprises, those that are required to submit an energy audit under Article 8 of the Directive should be registered in the information system, providing relevant information on their energy consumption and any other information provided for under the Directive as a measure equivalent to an energy audit. Energy auditors should enter the necessary information on energy audits carried out on both large enterprises and other interested parties (media, households, etc.). Furthermore, the design of the information system will include information concerning both equivalent measures in relation to energy audits (i.e. energy or environmental management standards), and the energy savings achieved and individual improvement measures implemented since the previous energy audit, so that such information can be presented and monitored. This information system is expected to be completed in September 2015.

METERING AND BILLING (ARTICLES 9-11)

This section gives information about ensuring the accuracy and validity of metering and billing information for final customers for electricity, natural gas, and heating/district heating. Moreover, steps taken or planned to be taken in the upcoming period concerning the installation of intelligent energy consumption metering systems are presented.

I. <u>Electricity</u>

In the case of electricity consumption, each consumer has an individual meter which accurately records the electricity consumed. For Low Voltage Consumers (residences, shops, small businesses), DEDDHE SA takes meter readings for electricity every four months and issues 'down payment' estimated bills in the time between readings.

Bills are issued bi-monthly. Consumers receive six electricity bills per year, three 'down payment' bills and three settlement bills, which are issued alternately.

The estimated consumption (on down payment bills) is automatically calculated by the company's computer system. The calculation is based on a specific algorithm that takes into account the historical data of consumption for the entire previous year, as well as consumption in the corresponding period of the previous year.

Then, after the settlement amount is calculated, i.e. the amount for the actual consumption of four months, the full amount of the 'down payment' bill is deducted from the settlement amount and the rest, together with the regulated charges, VAT, charges for third parties, etc., is the payable amount of the settlement bill.

The settlement bill, as opposed to the 'down payment' bill, provides accurate information of actual total consumption for a period of four months. Every bill contains information on the consumption period, and information on the date of issue of the next bill and subsequent meter readings.

Moreover, DEDDHE SA now offers consumers the possibility to participate in counting their consumption, by enabling them to report the meter readings by themselves every two months. If the meter reading registration service is chosen, DEDDHE SA automatically cancels the scheduled procedure of consumption estimation and instead calculates the total 2-month consumption, which is the difference between the readings that consumers have registered and the readings registered by the company two months before.

During the 2-month counting process, consumers take the meter reading and within the 5-day period which is clearly stated on their electricity bill, register the reading either by phone or online through the company's website (www.deddie.gr), or by downloading the free PPC SA mobile application (available for iphone, ipad, android smartphones and tablets).

The metering readings registration service enables consumers to read and monitor their electricity consumption, and also ensures actual recording of electricity consumption every two months.

Furthermore, PPC SA has developed an e-bill service, enabling consumers to directly access their bills at any time.

Regarding installation of smart meters, DEDDHE SA has already completed a pilot programme installing smart meters for 9,000 MV consumers (tertiary sector and industry) and has included the implementation of the following projects in its work programme:

- **Installation of telemetry system for large LV customers.** The project will replace 60,000 meters. Upon completion of the project, the effective and reliable collection, processing, management and storage of measurement data that, together with measurements of the installed MV smart meters, account for about 50% of final electricity consumption, will also have been achieved. The project is in progress and is expected to be completed in 2015.

- **Pilot telemetry and management system for the demand for electric power supply from residential and small commercial consumers and the implementation of smart grids.** The project will replace 160,000 meters and it will be implemented in its entirety within two years from the date of awarding the relevant contract.

Furthermore, Ministerial Decision Δ5/ΗΛ/Α/Φ33/2067 (Government Gazette, Series II, No 29, 02.18.2013) approved the gradual replacement of all existing final electricity consumption measurement systems with smart meters, so that at least 80% of existing meters will have been replaced with smart meters by 31 December 2020.

Medium and High Voltage Customers and Low Voltage Electric Power Supplies 5, 6 & 7

Monthly settlement bills are issued for Medium and High Voltage customers. To determine consumption, the load curve for the previous month is sent in the first days of each month and the energy consumed is calculated.

For Low Voltage Electric Power Supplies 5, 6 and 7, which correspond to Low Voltage large customers (e.g. department stores, offices, etc.), monthly settlement bills are issued based on the readings recorded by the metres in the first days of each month.

II. Natural gas

In Greece there are three natural gas supply companies, EPA Attiki SA, EPA Thessaloniki SA, and EPA Thessaly SA (for activities outside the scope of activity of EPA and for industrial customers, the natural gas provider is DEPA). The process for measuring consumption and the services offered are the same in both EPA Thessaloniki SA and EPA Thessaly SA, but differ in EPA Attiki SA. The following sections list details of these companies.

EPA Attiki SA

Gas consumption bills are issued at regular intervals, on a monthly basis for central heating and a bi-monthly basis for autonomous heating and non-heating domestic uses. Bills indicate the energy costs, calculated in proportion to the energy (kWh) consumed in the relevant period, separately from the fixed costs that are independent of consumption.

EPA Attiki SA measures consumption at least three times annually and issues an equal number of 'settlement' accounts. The company may, during the months when no measurement is made, charge for consumption on an estimated basis by issuing 'down payment' bills.

The amount of the 'down payment' bill is based on estimated consumption for the corresponding period. The estimate of consumption is based on the consumer's historical consumption data and the representative average consumption for the corresponding consumer capacity during the same period.

Every bill displays the type of the next bill, i.e. whether it will be a 'down payment' or a 'settlement' bill in the charges section .

Gas consumption is measured approximately every 60 days during the season when heating is used, and the consumption of natural gas (in cubic meters) is apportioned between the months included in the measurement period in proportion to the number of days in each such month. The value of natural gas is calculated for each month in euros (€).

The company gives customers the possibility, before receiving a 'down-payment' bill, to report their meter reading to EPA Attiki, in which case the scheduled estimate of consumption is automatically cancelled and the customers are billed on the basis of this reading.

Meter readings can be reported within 2 working days before and up to the 'next measurement' date shown on the latest bill, by contacting the Consumer Helpline or through the dedicated application on the website of EPA Attiki.

The company also provides a 'gas consumption telemetry service'. In cooperation with Vodafone, EPA Attiki offers natural gas consumers in Attica an innovative service for monitoring and instantly reporting their natural gas consumption.

The Smartecometer GAS service allows gas consumers to receive information on their natural gas consumption via the Internet and a dedicated website, as well as by SMS. It is an integrated subscription-based service, provided by Vodafone. It offers the following capabilities:

- monitoring natural gas consumption anytime anywhere, via Internet and SMS notifications;
- viewing consumption statistics per day, hour, month for any period of time (during which the service was available), in the form of charts and reports in cubic meters or KWh;
- viewing comparisons with previous consumption periods (during which the telemetry service was being provided);
- receiving SMS and e-mail notifications of monthly consumption, and consumption during an unexpected period of time;
- receiving e-mail notifications if consumers exceeded their maximum defined consumption limit;
- receiving notifications of the price of natural gas on a monthly basis;
- receiving estimations of consumption cost;
- viewing reductions in carbon dioxide (CO2) emissions from the use of natural gas compared to the use of heating oil.

The service includes installation of a dedicated telemetry device (meeting the required standards of EPA Attiki) on the natural gas meter of EPA Attiki customers, which records gas consumption data and transmits them through Vodafone's reliable data network to the service's central application.

Consumers-subscribers of the service can access their consumption, easily, at any time of the day through a simple web browser and a broadband connection to the Internet on any personal computer.

The information available on the website of the service relates to consumption up to the previous day.

The SmartEcoMeter Gas service is subscription-based and is offered for a fixed monthly fee of EUR 6.00 (incl. VAT).

The one-off cost for purchasing the telemetry device is EUR 198.00 (incl. VAT). The device can be interconnected with up to two meters installed in the same area.

EPA Thessaloniki SA - EPA Thessaly SA

Natural gas consumption is billed on the basis of gas meter readings and bills are issued-sent to consumers.

Billing is made periodically depending on the billing category, in accordance with the General Terms and Conditions, the pricing policy and the Charter of Customers' Obligations.

Customers are placed in billing categories depending on the use and annual gas consumption, as follows:

- Category T1 for consumption up to 650 m3/ year or 7.18 MWh/year for cooking and hot water use.
- Category T2 for consumption of more than 650 m3/ year up to 3,000 m3/ year or 33,145 MWh/year for autonomous domestic heating, cooking and hot water use, and small commercial activity.
- Category T3 for consumption of more than 3,000 m3/ year or 33,145 MWh/year for central domestic heating, hot water use, heating of other type of buildings, and technological activity. This category also includes large customers (T3A) with a consumption of more than 30,000 m3/ year or 331,45 MWh/year and meter category G65 or higher.
- Category T3C (cogeneration) for consumption greater than 2.2 GWh/year
- Category T3D (air conditioning) for consumption greater than 2.2 GWh/year
- Category T5 for industrial consumption equal to or greater than 2.2 GWh/year.

EPA takes all reasonable steps to take regular meter readings.

During the year, meter readings are taken with the following frequency:

- three times for customers billed every four months (billing category T1);

- four times for customers billed every two months (billing category T2);
- every month for customers billed once a month (except in the summer season for customers using natural gas only for heating) (pricing category T3)

Invoices may be issued either based on meter readings, or on consumption reported by customers after having taken the meter reading themselves, or based on estimated consumption (during the summer season or when it is not possible to read the meter).

Heating oil

In the case of buildings with a shared heating system using heating oil as fuel, the manager of the building is responsible for the supply of heating oil. There are two categories of shared heating systems: the autonomous and the central heating systems.

In buildings with an autonomous heating system, each apartment has an individual consumption meter. Consumption meters are either time-based or calorie-based. The allocation of heating energy consumption, and the issue of bills for each user, is undertaken by authorised building maintenance companies which bill users for energy consumption on the basis of the area of their apartments and their meter readings.

In buildings with a central heating system, energy consumed is also allocated by authorised building maintenance companies. In this instance the allocation is based on the area of each apartment.

District heating

Heat energy is provided by a district heating provider to consumers via the district heating network, containing pipes, substations, heat regulation and measurement systems and relevant accessories.

Heat energy is supplied by the district heating provider via a thermal substation, which is installed in an area owned by consumers.

Consumption of heat energy which is delivered at the hot water delivery point is performed is measured using metering devices (heat meters) provided by the heating provider, which are installed at the thermal substation located in the consumer's building and which record the total consumption of the building. The heat meter is the only authorised device for measuring and billing the thermal energy consumption.

The allocation of thermal energy consumption per user in a building is made based on the area of the dwellings and the water supply.

CONSUMER INFORMATION AND TRAINING PROGRAMMES (ARTICLES 12 AND 17)

As part of the programme 'Saving Energy at Home', which is analysed in section 3.2.2, a large-scale information campaign was held to inform households of the benefits of their potential involvement in the programme and to facilitate those who finally decided to join the programme.

Detailed information regarding the actions implemented under this campaign is listed in Table 15.

As part of this programme and after the establishment of the Special Holding Fund 'Saving Energy at Home', an open call for tenders was launched for banks to be involved in the Fund's activities.

The banks that finally registered to take part in the programme are:

- Alpha Bank SA
- National Bank of Greece SA
- Piraeus Bank SA
- E.F.G. Bank Eurobank - Ergasias SA

In addition to the investments provided for in the programme 'Saving Energy at Home', these banks are also financing, by granting green loans, interventions aimed at improving the energy efficiency of their residential and commercial customers. Public awareness-raising and campaigning on these funding programmes are organised by these banks themselves.

Table 15: Information about the publicity campaign for the programme 'Saving Energy at Home'.

	Budget Analysis of the Publicity Campaign for the Programme	Implementation period	Action	Quantitative data	Cost before VAT (€)
1	Creating a special entry for the programme 'Saving Energy at Home'	12/2010-1/2011	Creating an entry in the 'Saving Energy at Home' Theme and corresponding adjustments.	4 models and 30 adjustments.	5,972.66
2	Creating radio ads for the programme 'Saving Energy at Home'	12/2010-1/2011	Creating radio ads in the thematic section 'Saving Energy at Home'	3 radio ads	7,533.73
3	Radio programme on 'Saving Energy at Home'	January 2011	Broadcasting the show in January 2011 on 24 radio stations in Athens and Thessaloniki and 98 stations in the region.	Total broadcasts: Athens - Thessaloniki 24 stations (1,176 broadcasts), Region 98 stations (2,332 broadcasts) Total: 122 stations and 3,508 broadcasts. Geographical coverage: Nationwide.	167,023.00
4	Creating banners for the online campaign for the programme 'Saving Energy at Home'	12/2010-1/2011	Creating Internet banners in the thematic section 'Saving Energy at Home'	4 Internet banners	4,505.00
5	Internet video ad for the programme 'Saving Energy at Home'	1/2011-2/2011	Broadcasting of the video ad on 35 websites in January and February 2011.	Total broadcasts: 12,980,636 impressions. Geographical coverage: Nationwide.	65,892.42

6	Creating and printing a brochure and a poster for the programme 'Saving Energy at Home'	11/2010-12/2010	Creating and printing one (1) four-fold information brochure sized 10X21 (closed) and one (1) poster sized 43x58cm.	Number of printouts of the four-fold information brochure 92,000 pieces and number of poster printouts: 1,900 pieces.	9,979.22
7	Modifying the brochure for the programme 'Saving Energy at Home'	06/2011-07/2011	Creating and printing one new (1) fourfold information brochure sized 10X21 (closed) for the thematic section 'Saving Energy at Home' to reflect changes to the programme.	Number of printouts of the modified four-fold information brochure: 2,000 pieces.	1,154.00
8	Promotional programme in nationwide and regional newspapers for the programme 'Saving Energy at Home'	1/2011-2/2011	Promotional on the Programme in 46 nationwide and 112 regional newspapers in January and February 2011	Total listings nationwide 47, regional 112 Total: 159 Geographical coverage: Nationwide	306,341.46
9	Photos for multimedia applications	12/2010-1/2011			1,636.51
10	Creating a Helpdesk	10/2010-12/2011	Creating a Helpdesk at the phone number 210-9797400 for the programme 'Saving Energy at Home' operating on working days from 08.00 to 16.00. Creating an auto-reply service for the emails received from citizens.	The helpdesk for the programme 'Saving Energy at Home' started operating in October 2010. During the period from 1 October 2010 until 31 December 2011, the helpdesk received 92,103 calls and 1,262 emails.	120,120.00
11	Creating a website and	10/2012-01/2011	Creating & supporting	Creating & supporting the	21,800.00

	interactive applications		Web portal providing information to users in Greek. Developing a web interactive application for dwellings energy classification and an online questionnaire on the use of energy by citizens. Developing a web application for the use of energy by suppliers/contractors.	website http://exoikonomisi.ypeka.gr. The website for the programme started operation in January 2011. The number of visits by 31 December 2011 stood at about 320,000.	
12	Translating the website into English and changing the website's photos	04/2011-05/2011	Translating the website into English and editing the website's photos by adding English text.		1,157.45
13	Participation in the Thessaloniki International Trade Fair 2011	September 2011	Participation of the Ministry of Environment, Energy, and Climate Change in the 76th Thessaloniki International Trade Fair	Approximately 5,000 attendees visited the stand of the Ministry in the 76th Thessaloniki International Trade Fair	29,011.11
14	Participation in the Execonomo Expo Trade Fair 2011	02/2011-03/2011	Participation in the Execonomo Expo Trade Fair 2011	Contacting 1,500 participants. Number of programme forms distributed in the trade fair: 870 pieces.	9,984.18
	Total cost of publicity actions for the programme 'Saving Energy at Home' (€)				752,110.74

QUALIFICATION, ACCREDITATION AND CERTIFICATION SCHEMES (ARTICLE 16)

There is no qualification, certification and accreditation scheme for providers of energy services, energy auditors, energy managers and installers of energy-related building elements. Moreover, there are no suitable training programmes developed for these specialties.

The project 'BUILD UP Skills - Greece' (http://greece.buildupskills.eu/) aimed at preparing the necessary procedures for the training and qualification of the building sector workforce through the development and widespread acceptance of a National Qualifications Road Map. The Centre for Renewable Energy Sources (CRES) was the coordinator of the project, and eight other partners participated. The project was launched in June 2012 for a total duration of 18 months. Its ultimate goal was to develop a national road map for the integration of training on intelligent energy solutions for buildings in the mainstream study curricula and practice of building professionals. The road map, based on an analysis of the current situation at national level, factored in the expected contribution of the building sector in the national targets for 2020 and the requirements for 'nearly zero-energy' buildings. The national road map has to be accepted by the competent authorities and all parties involved, with a commitment to deliver and implement the proposed strategy. This procedure was adapted to the specific conditions of the Greek market, and helped launching a national dialogue involving all stakeholders on the issues of training and qualifications of the workforce in the construction industry in energy efficiency and renewable energy sources (establishment of the 'National Qualifications Platform'). Apart from the project partners, the institutions presented in Table 16 have come forward to support and actively participate in the 'National Qualifications Platform'.

As part of this project, the following actions were taken:

- ✓ An extensive review of existing seminars and training courses on the various skills of construction workers, both conventional (builders, plumbers, electricians, etc.) and specialised (installers and supervisors).
- ✓ Analysis of the current situation with an emphasis on identifying obstacles and skills shortages.

- ✓ Determination and quantification of needs and priorities ensure a sufficient number of members of the workforce are qualified in energy efficiency and RES by 2020.
- ✓ Development of the National Qualifications Road Map to achieve the energy policy objectives for 2020 with respect to continuing education and training of the workforce in the construction industry.

Table 16: Institutions participating in the 'National Qualifications Platform'.

Institutions
Ministry of Environment, Energy and Climate Change (YPEKA)
Ministry of Education, Religious Affairs, Culture and Sports
Ministry of Labour, Social Security and Welfare
Hellenic Association of Mechanical and Electrical Engineers (HAMEE)
Hellenic Association of Chemical Engineers (HaChe)
Association of University Graduate Architects-Panhellenic Union of Architects (SADAS-PEA)
Association of Civil Engineers of Greece (ACEG)
Hellenic Association of Photovoltaic Companies (HELAPCO)
Greek Solar Industry Association (EBHE)
Hellenic Association for the Cogeneration of Heat and Power (HACHP)
Panhellenic Federation of Glass Tradesmen & Manufacturers (POEVY)
Aluminium Association of Greece (AAG)
Panhellenic Federation of Craftsmen Aluminium and Iron Manufacturers (POVAS)
Union of Hellenic Enterprises for Heating and Energy (ENEEPITHE)
Public Corporation for the Construction of Hospital Units (DEPANOM)
Association of Greek Contracting Companies (SATE)
Hellenic Technical Employees Association (STYE)
Hellenic Federation of Craftsmen & Plumbers (OBYE)
Panhellenic Federation of Electrical Contractors' Association (POSEH)
Greek Federation of Electricians (OHE)
Greek Federation of Refrigeration Technicians (OPSE)
Union of Oil – Gas – Biomass Burners Installers "ESTIA"
Hellenic Association of Accredited Certification and Inspection Bodies (HellasCert)
Hellenic Organisation for Standardisation (ELOT)
Hellenic Accreditation System S.A. (ESYD)

Union of Hellenic Chambers (UHC)
Panhellenic Association of Engineers Contractors of Public Works (PEDMEDE)
Hellenic Association for Adult Education (AAE)
Greek Manpower Employment Organisation (OAED)
National Institute of Labour and Human Resources (NILHR)
Hellenic Association of Vocational Training Centres (ELSEKEK)
Panhellenic Association of Vocational Training Centres (PASYKEK)
Attica Bank
Panhellenic Association of Insulating Material Companies (PSEM)
Hellenic Association of Expanded Polystyrene (HAEPS)
Greek Federation of Builders and Woodworkers (OOXE)
Greek Association of Aluminium Manufacturers (SEKA)
School Buildings Organisation SA

However, the results of this project cannot themselves lead to the development of a qualification, certification and accreditation scheme for the specific workforce skills.

These schemes must be developed and validated in collaboration with the National Quality Infrastructure System (NQIS) and the National Organisation for the Certification of Qualifications & Vocational Guidance (EOPPEP).

ENERGY SERVICES (ARTICLE 18)

Law 3855/2010 established the institutional framework for the provision of energy services. More specifically, Article 10 introduced the requirement to establish an ESCO Registry for the registration of ESCOs providing energy services and other measures to improve energy efficiency. The details on the operation of the ESCO Registry were established by Ministerial Decision D6/13280/07.06.2011 (Government Gazette, Series II, No 228) entitled 'Energy Service Companies. Operation, Register, Code of Conduct and relevant provisions'.

This Ministerial Decision determined, among other matters, the establishment and organisation of the ESCO Registry (Article 3), its content (Article 4), the registration procedure (Article 5), the criteria for inclusion and supporting documents for registration of ESCOs in the Registry (Article 6) and issues related to the handling and use of its entries (Article 8).

Article 7 of this Ministerial Decision defined the ESCO categories. Specifically, the companies registered in the ESCO Registry are classified in the following categories:

(a) category A, which includes all the companies registered in the ESCO Registry,

(b) category B, which includes all the natural persons registered in the ESCO Registry,

The companies registered in the ESCO Registry (category A) are further classified into the

following subcategories:

(a) subcategory A1, if they have implemented or have been implementing projects with ESCOs with a total budget of at least EUR 300 000.00 for the last five years,

(b) subcategory A2, if they have implemented or have been implementing energy projects with a total budget of at least EUR 1 million for the last five years, and

(c) subcategory A3, for all other companies registered in the ESCO Registry.

The Directorate for Energy Policy and Energy Efficiency of the Secretariat-General for Energy and Mineral Raw Materials of the Ministry of Environment, Energy and Climate Change is in charge of keeping the ESCO Registry and of providing information to consumers on energy services.

To be registered in the ESCO Registry, a company has to fill in an online application and send the relevant supporting documents to the competent department. Then, the competent department crosschecks and verifies the validity of the submitted documents. At this stage, it may request additional information from companies, protecting their business secrets. After the supporting documents are checked and if the registration criteria of Article 6 are met, the company is registered in the ESCO Registry and will be sent the following:

(a) the registration certificate, which includes the registration number allocated to the company, and

(b) the password for the relevant information system.

The details of the ESCOs registered include:

(a) Name and registration number,

(b) Contact details,

(c) ESCO category and subcategory.

These details are posted on the website of ESCO Registry (http://www.escoregistry.gr).

It should be noted that registration in the ESCO Registry is optional.

The same Ministerial Decision establishes several issues regarding the conditions of establishment and operation of ESCOs (Article 9), the energy services provided (Article 10), the criteria for the proper performance of their duties (Article 11), incompatibilities with their duties (Article 12) and administrative sanctions applicable to them (Article 13).

Finally, Article 14 establishes the Code of Ethics regarding the principles and the commitments that the ESCOs registered in the respective register must comply with to ensure the smooth operation and the proper development of the market for energy services.

Article 16 of Law 3855/2010 provides a detailed description of the issues relating to the Energy Performance Contract (EPC), an agreement concluded in writing between the final customer

and the Energy Service Company (ESCO) and contains the formal data to be included in a contract, as provided for in Law 2251/1994 (Government Gazette, Series I, No 191, 16-11-1994) on consumer protection.

The EPC should specify, among other things, the following:

I. the design and management of the energy service and the energy service provided;

II. the methodology for assessing energy savings and valuing the resulting overall financial benefit;

III. the purchase, installation and commissioning of the necessary energy-using equipment, such as electromechanical and electronic systems, as well as building envelope materials, whether fixed or not, improving energy end-use efficiency;

IV. the management, the operating method and the maintenance of the equipment;

V. the overall cost of the project, which consists of the cost of supply and installation of the necessary equipment, the cost of its operation and maintenance, the financing cost and the fee paid to the ESCO;

VI. the procedure for assessing the energy benefit;

VII. the reimbursement method and time.

The Directorate for Energy Policy and Energy Efficiency prepared and posted two EPC templates. These templates and the website on which they are posted are given below:

Template of guaranteed performance EPC

(http://www.escoregistry.gr/eggyimeni apodosi.pdf)

Template of shared benefit EPC

(http://www.escoregistry.gr/diamoirazomeno ofelos.pdf)

To remove regulatory and non-regulatory barriers that prevent the conclusion of EPCs in the public sector, CRES is implementing a project entitled 'Supporting and monitoring of the pilot implementation of energy efficiency improvement projects in public buildings by Energy Service Companies (ESCOs)', which is funded by the Operational Programme 'Environment & Sustainable Development' for the period 2007-2013 (Priority Axis: 1).

Below is a detailed description of the project.

Title		**Supporting and monitoring the pilot implementation of energy efficiency projects in public buildings by Energy Service Companies (ESCOs)**
Measure Code		
Description	Category	cle 18: Energy Services
	Implementation schedule	Start: February 2012 End: November 2015
	Purpose / brief description	The project aims to standardise procedures and remove regulatory barriers to the implementation of measures to improve energy efficiency in public sector buildings by ESCOs through energy performance contracts (EPC). Specifically, the project aims to: 1. support YPEKA in developing the ESCO market and, through selected pilot applications, in identifying technical, procedural and regulatory parameters and conditions for the implementation of these kinds of contracts and projects, 2. ensure that ESCOs have access to energy efficiency programmes for public sector buildings and make use of the Third Party Financing (TPF) mechanism to achieve the national energy targets in public sector buildings, through the expertise and funds of the private sector, 3. disseminate the results of the project so they serve as a guide and to specify the implementation framework for the developing ESCO market and to implement energy projects in the remainder of the public sector and broader public sector buildings.
	End use	Public sector
	Target group	Public sector buildings

	Regional application	All of Greece.
Information on implementation	List and description of energy saving measures	CRES has undertaken to determine major energy consumers, the technical specifications and preparation of the process, to monitor the implementation of contracts, to assess the benefits of energy interventions and to organise example actions. ESCOs will implement energy efficiency improvement measures in the building envelope in 5 selected public sector buildings.
	Budget and funding	• Total project budget: EUR 589 713.00 (financed by the Operational Programme 'Environment and Sustainable Development' 2007-2013 OPESD) • Estimated budget for the investment in the relevant buildings: EUR 3.4 million (financed by ESCOs)
	Implementation	CRES and ESCOs that will participate in the programme
	Expected results	The processing of energy analyses in 6 of the buildings under review led to the following conclusions regarding the benefits that will result from this project through the implementation of the proposed energy saving interventions. • Annual energy savings: 5,184 MWh • Total saving percentage: 23% • Average payback period: 5.1 years • Job creation: 38 man-years • Total investment cost for the energy saving interventions: EUR 3.4 million • Total annual economic benefit for public bodies: EUR 674 000.00

Regarding the presentation of the current state of the national energy services market, it is worth mentioning that the market for energy services is still in the early steps of development.

However, several ESCOs have begun to show considerable interest in implementing interventions to improve energy efficiency through EPCs. To this end 101 companies have already submitted online requests for registration in the ESCO Registry, and 209 have initiated, but not yet completed, the application process. The competent department of YPEKA has included in the Register and published data on 28 ESCOs. This is included on www.escoregistry.gr, which also gives information on the classification of enterprises providing energy services.

It is noteworthy, however, that only one out of the 28 ESCOs has concluded an EPC with a budget of less than EUR 300 000.00 However, there are other ESCOs also active in the market, which have entered into a limited number of EPCs mainly in the private industrial and tertiary sector.

Although there are no estimates for the future development of the total value of energy saving programmes and the total value of potential energy efficiency programmes in areas other than households, the market for energy services has significant growth potential. The removal of regulatory barriers to the conclusion of EPCs in the public sector should lead to the implementation of interventions to improve energy efficiency in public sector buildings, which are characterised by a very high potential for energy saving. Moreover, Article 7 provides for the conclusion of EPCs by ESCOs to implement energy saving projects in tertiary sector buildings. A more detailed presentation of this measure is shown in Annex B. Finally, it is also envisaged that the Green Fund will provide funding to ESCOs for the implementation of projects to improve energy efficiency.

OTHER HORIZONTAL MEASURES TO PROMOTE ENERGY EFFICIENCY (Articles 19 and 20)

This section presents the other horizontal energy efficiency measures, which do not fall within Article 7 and which have been or will be adopted for the implementation of Articles 19 and 20 of the Directive.

The measures, which are presented in Table 17, include actions which are not closely linked to a specific sector or branch, but are considered essential for the implementation and monitoring of all of the supported actions in all the sectors. They centre principally on the collection and evaluation of relevant information and the provision of financial support through the operational programmes.

Table 17: Horizontal policy measures for energy efficiency improvement

No	Title of measure	Final use targeted	Start
O1	Information system for monitoring energy efficiency improvement and achieved energy savings	Market research in all areas of final energy consumption Methodologies for data collection in the areas of final energy consumption and database creation	Since 2009
O2	Programmes to provide financial support for investment in energy-saving technologies and research	Penetration of energy efficient systems for heating, cooling, electricity generation and building construction products	Since 2009
O3	Tax exemptions of energy savings interventions	Energy efficient technologies / interventions in all end-use areas	Since 2012
O4	Implementation of an energy management system (EMS) in the tertiary and public sectors	Total energy consumption of the target group	Since 2012
O5	Bioclimatic upgrades of public open spaces	Energy consumption for cooling-heating	Since 2011
O6	Green rural and island communities - New development model	Total energy consumption of the target group	Since 2011

Below is a breakdown of the horizontal measures.

Title		Information system for monitoring energy efficiency improvement and achieved energy savings
Measure Code		**O1**
Description	Category	Support action
	Implementation schedule	Start: 1/7/2009
	Purpose / brief description	The purpose of this measure is to develop an information system incorporating all necessary digital services for energy modelling and statistical databases to support the national policy for improving energy end-use efficiency, under the relevant national energy targets.
	End use	Market research in all areas of final energy consumption. Methodologies for data collection in the areas of final energy consumption and database creation.
	Target group	The target groups of this measure are: The energy sector of the Ministry of the Environment, Energy and Climate Change, where the maximum use of infrastructure and systems to be developed, will enable the efficient monitoring of the directives on energy end-use efficiency and energy services, and other directives relating to energy savings. Businesses and professionals active in the field of energy savings and cogeneration, as well as those to be active in the coming years, e.g. energy service companies, energy inspectors, etc. Final consumers in the residential, tertiary, industrial, agriculture and transport sector.
	Regional application	All of Greece

Information on implementation	List and description of energy saving measures	Through the implementation of the information system, all the necessary tools related to the quantitative monitoring of national targets will be provided, so that Energy Efficiency Action Plans are designed and planned, and it will be further possible to ex post evaluate the degree of implementation of the measures and the achievement of the National Energy Savings Targets contained therein. The information system will be outward looking and will also form a key support tool for the operators of the energy market, including companies providing energy services and energy efficient equipment, end users, energy inspectors, energy decision makers etc. Specifically, the Information System developed has the following key objectives: • Analysis of energy consumption in all end-use sectors, through the collection and statistical analysis of energy data, by also conducting market research, where appropriate. • Recording, representation and updating of the necessary statistical data of energy consumption and the respective energy indicators. • Development of all records and databases provided for to support the monitoring of the national energy savings target (Record of inspections in buildings, inspectors record, record of energy service companies, record of energy efficiency contracts, aggregated statistics from market operators subject to energy consumption limitations). • Energy Planning of Energy Savings and High Efficiency Cogeneration. • Monitoring, with computational models, of the energy planning of Energy Efficiency Action Plans and the progress made in their implementation. • Supporting the development of the energy services and energy-efficient equipment market.

		• Provision of information to energy distributors, providers of energy efficiency improvement measures and final energy consumers on the ways and opportunities to improve energy efficiency and to support the process for making optimum energy decisions through the provision of appropriate information tools on the market, legislation and good practice. • Preparation of market studies to evaluate the energy efficiency in all end-use sectors, and development of monitoring indicators as part of the national target for 2016. Meanwhile, it is intended to develop infrastructure (databases, records) and to create an integrated information system and the methodology to collect primary data.
	Budget and funding	The project is nationwide and co-financed by the European Regional Development Fund (ERDF) and public funds. Operation integrated into the OP "Digital Convergence", NSRF. Operation title: 'National Information System for Measuring Energy Efficiency under Directive 2006/32'. Budget: EUR 2.78 million.
	Implementation body	CRES
	Supervisory Authority	Ministry of Administrative Reform and e-Governance (Managing Authority of Operational Programme 'Digital Convergence')

Title		Programmes to provide financial support for investment in energy-saving technologies and research
Measure Code		**O2**
Description	Category	State aid
	Implementation schedule	Start: 2009
	Purpose / brief description	• Public aid for private investment in renewable energy sources, cogeneration of heat / power / cooling, energy saving and the substitution of conventional fuels through the resources of the operational programmes and of the development law. • Public aid to promote cooperation between undertakings, research bodies and education establishments on technological development and demonstration research projects with long-term relevance to stimulate the production of innovative products and services with the objective of: ✓ reducing cost and promoting renewable energy sources (RES); ✓ developing new technological applications, systems and energy efficiency improvement materials;
	End use	Penetration of energy efficient systems for heating, cooling, electricity generation, building construction and transport
	Target group	• Industry • Tertiary sector • Transport

		• Research centres, institutes • Universities and technological institutes
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	Various programmes to provide financial support for investment in energy-saving technologies and research have been completed or are underway: • Law 3908/2011 'Enhancing Private Investment for Economic Development, Entrepreneurship and Regional Cohesion' (Government Gazette, Series I, No 8, 1 -02-2011), as recently amended by Law 4146/2013 'Creation of a Development Friendly Environment for Strategic and Private Investments and other provisions' (Government Gazette, Series I, No 90, 18-04-2013), aims at strengthening financial support to investments for the promotion of the green economy. • Actions launched by the General Secretariat of Research and Technology and financed by the National Strategic Reference Framework 2007-2013. Examples of such actions are: ➢ Innovation vouchers for small and medium-sized enterprises (2009) with a budget of EUR 7 833 000.00 ➢ Action 'COOPERATION 2009' (2009) with a budget of EUR 76 100 000.00 ➢ Aid to Postdoctoral Researchers (2010) with a budget of EUR 30 000 000.00 ➢ Action 'COOPERATION 2011 - Partnerships between industry and research institutions focused on research & technology areas' (2011) with a budget of EUR 68 320 000.00 ➢ Action 'EXCELLENCE' (2011) with a budget of EUR 60 000 000.00 ➢ Action 'EXCELLENCE II' (2012) with a budget of EUR 60 000 000.00 ➢ Action 'Industrial Research and Technology Development Programme (PAVET) 2013' (2013) with a budget of EUR 29 000 000.00

		Law 3851/2010 'Accelerating the development of Renewable Energy Sources to address climate change and other provisions relating to issues with the competence of the Ministry of Environment, Energy and Climate Change' (Government Gazette, Series I, No 85, 04-06-2010), as amended by Law 4001/2011 'Operation of energy markets in electricity and natural gas for research, production and hydrocarbon transmission networks and other arrangements' (Government Gazette, Series I, No 179, 22-06-2011) , and the 2014 omnibus bill 'Measures for the support and development of the Greek economy within the scope of Law 4046 / 2012 and other provisions', provide for a favourable selling price for electricity from CHP plants.
	Budget and funding	National Strategic Reference Framework 2007-2013 and private funds.
	Implementation body	Ministry of Development and Competitiveness, Ministry of Environment, Energy and Climate Change, Ministry of Education and Religious Affairs
	Supervisory Authority	Ministry of Finance, Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness, Ministry of Education and Religious Affairs

Title		Tax exemptions on energy savings interventions
Measure Code		**O3**
Description	Category	Tax incentives
	Implementation schedule	Start: 2012
	Purpose / brief description	The purpose of the measure is to introduce tax incentives to promote energy efficient technologies / interventions
	End use	Energy efficient technologies / interventions in all end-use areas
	Target group	Final consumers, natural and legal persons
	Regional application	All of Greece.
Information on implementation	List and description of energy saving measures	Article 25 of Law 4067/2012 (Government Gazette, Series I, No 79, 09-04-2012) 'New Building Code', provides incentives for minimum energy consumption buildings. More specifically, incentives are provided to increase the plot ratio to 10% in the case where the building has a particularly high energy efficiency ratio or environmental performance. Law 4178/2013 'Tackling illegal building - Environmental Balance and other provisions' (Government Gazette, Series I, No 174, 08-08-2013) provides that a joint decision of the Ministers for Finance and for Environment, Energy and Climate Change may allow the amounts paid for services rendered, work and materials on the energy upgrade and the structural adequacy of buildings erected before 2003 to be offset against the special fine, up to 50% of the fine. Moreover, Article 51 provides that for legally existing uses of buildings or facilities which are retained, and also for uses

		covered by building permits issued under Article 26 of Law 2831/2000, it is permitted, within a period of three years, to carry out energy upgrading works and works on the layout of building with the purpose of improving the environment, on the basis of the building regulations which were applicable at the time the derogation was granted. Laws 4110/2013 (Government Gazette, Series I, No 17, 23-01-2013) and 4172/2013 (Government Gazette, Series I, No 167, 23-07-2013) repealed the exemptions for expenses for energy efficiency improvement interventions, as implemented under Law 3522/2006 (Government Gazette, Series I, No 276, 22-12-2006) and Law 3842/2010 (Government Gazette, Series I, No 58, 23-04-2010). However, the new legislation is expected to introduce a reduction in income tax at a specific percentage of the costs for energy upgrading interventions of buildings which are performed after an energy inspection and which relate to the following: • installing a new, or replacing the existing, burner and/or oil boiler system to install a natural gas system (central or individual) or a system operated mainly by Renewable Energy Sources or a high efficiency combined heat and power system or a district heating/cooling system, • making interventions in the existing distribution network system (automatic devices, circulators, chimney, pipe replacement or insulation, etc.), including the terminal heat output units (radiators, underfloor heating system, etc.), • changing the central air conditioning installation from oil powered to natural gas powered or installing a new natural gas system, • installing solar systems for hot water use and installing a central solar powered air conditioning system, • installing decentralised power generation systems powered by renewable energy sources (solar panels, small wind turbines) and cogeneration of electricity and cooling - heating with natural gas or renewable sources,

		• installing thermal insulation on the building envelope by placing double energy glazing and heat insulated/ thermally broken window frames, • installing thermal insulation (external and internal) on the building envelope including the flat roof/roof and the piloti (open parking space in place of the ground floor of the building), • installing automatic control devices for the heating system, • additional work required to complete implementation of the intervention, • the cost of an energy inspection by a qualified energy inspector. The amount of the expenditure on which the above reduction is calculated may not exceed EUR 15.000.
	Budget and funding	-
	Implementation body	Ministry of Finance
	Supervisory Authority	Ministry of Finance

Title		Implementation of an energy management system (EMS) in the tertiary and public sectors
Measure Code		**O4**
Description	Category of measure	Institutional/regulatory
	Implementation schedule	Start: 2012
	Purpose / brief description	The Energy Management System is a process based on the international or European standard (EN 16001 or ISO 50001) which aims at monitoring the energy performance of a system to improve its energy efficiency and reduce energy costs.
	End use category	Total energy consumption of the target group
	Target group	• Compulsory implementation in all public sector buildings. • Buildings with overall surface area exceeding 1000 m^2
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	Article 8(1) of Law 3855/2010 "Measures to improve energy efficiency in end use, energy services and other provisions" provides for the gradual implementation of an energy management system to all central and general government agencies. Article 8(1) of the this Law also states that the principles, requirements and guidelines of the Energy Management System shall be determined in accordance with the International or European Standard (EN 16001), as applicable from time to time.
	Budget and funding	

	Implementation body	Competent ministries
	Supervisory Authority	Ministry of Environment, Energy and Climate Change

Title		Bioclimatic upgrades of public open spaces
Code of measure		**O5**
Description	Category	Exemplary role of the public sector
	Implementation schedule	Start: 2011
	Purpose / brief description	The programme **'Bioclimatic upgrades of public open spaces'** involves bioclimatic interventions in areas where significant climate problems are observed and its main objective is to improve the quality of life, to slow down and ultimately to reverse urban climate change and to improve the economic and social parameters associated with it. Projects meeting specific climate targets and for which fully mature studies have been prepared are eligible.
	End use	Energy consumption for cooling-heating
	Target group	• Urban environment • The general public.
	Regional application	All of Greece.
Information on implementation	List and description of energy saving measures	Projects eligible for the **'Bioclimatic upgrades of public open spaces'** programme will be those that meet specific climate targets and are accompanied by fully developed studies, based on the programme's specifications manual. Indicative eligible categories of intervention are: ➢ increasing soft permeable surfaces and reducing hard, accessible soil cover surfaces; ➢ replacing conventional hard materials with others whose characteristics

		contribute to improving the microclimate and with photocatalytic materials that reduce pollutants; ➢ increasing shaded areas in the summer; ➢ increasing surfaces exposed to sunlight in the winter; ➢ increasing green areas; making use of heat sinks; ➢ introducing/installing photovoltaic panels on sidewalks, pergolas and blinds. Moreover, the programme includes actions to distribute information and raise awareness.
	Budget and funding	Total financing: EUR 60 million Source: NSRF - OPESD Application submission period: 01.09.2011- 31.10.2011
	Implementation body	CRES
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	A total of 16 proposals were included in the financing scheme with a total budget of EUR 59 758 190.00 The implementation of interventions is expected to lead: ➢ to the increase of green spaces by 61.5 thousand m2; ➢ to an average energy saving of about 14.4%; ➢ to an average reduction in greenhouse gas emissions of 14.7%; ➢ to a greenhouse gas emission reduction of 5 kt CO_{2eq} ➢ to the creation of 1 064 jobs equivalent to 1 064 man-years of employment

Title		Green rural and island communities - New development model
Code of measure		**O6**
Description	Category	Exemplary role of the public sector
	Implementation schedule	Start: 2011
	Purpose / brief description	The programme **'Green rural and island communities - New development model'** aims to achieve balanced, sustainable regional development while creating pioneering economies, highlighting the particular characteristics of isolated communities, creating new jobs, strengthening various forms of tourism, familiarising the public and employees with Green Development practices. The direct result and purpose of all the above will be to retain and increase the productive population. The ultimate goal is to implement a new Green Development Standard, offering high added value potential and prospects for the local economy. The main objectives of the programme include addressing climate change and reducing air pollution, achieving energy savings in public buildings and housing, improving thermal, optical and environmental conditions in public buildings and housing, improving the microclimate of the broader area, promoting RES and best solid waste management practices, recovering waste energy, streamlining the facilities for water resources management and protection of vulnerable groups, especially in extreme weather/climate conditions.
	End use	Total energy consumption
	Target group	• Public buildings and housing

		• Transport • Urban environment • The general public.
	Regional application	All of Greece. Potential beneficiaries for proposals in the programme are the LAs included in the 'Kallikrates' Programme where the proposed projects/interventions can be carried out in rural or island 'communities' with a population of less than 1 000 inhabitants based on the last census.
Information on implementation	List and description of energy saving measures	Creating a Rural or Green Island 'Community' may, for example, be accomplished through the following interventions: (1) Energy savings interventions in public buildings ➢ Energy upgrade of public buildings' envelope: installation of thermal insulation, window frames, cool materials, shading ➢ Energy upgrade of public buildings' equipment: Heating, air conditioning, ventilation, distribution, control and automation ➢ Use of RES to cover Thermal-Cooling Loads of Buildings: Solar-thermal energy, shallow geothermal energy, biomass ➢ Installation of renewable energy systems, which do not generate revenues (2) Transport ➢ Replacement of the municipal vehicle fleet with electric vehicles using RES (3) Public lighting ➢ Installation of energy saving lamps ➢ Replacement of conventional light switches with electronic ones ➢ Installation of street lighting control and management system ➢ Independent photovoltaic lighting systems (4) Excess RES energy saving

		(5) Bioclimatic upgrade of public spaces (6) Management of Water Resources: ➢ Desalination using RES ➢ Utilisation of surface/groundwater (7) Management of solid waste - biogas processing unit (8) Generation of electricity using RES (9) Training, dissemination, networking and information actions
	Budget and funding	Total financing: EUR 50 million Source: NSRF - OPESD Application submission period: 05.03.2012- 25.06.2012 After completion of the evaluation of submitted proposals, seven beneficiaries will join the programme and will be funded with a total budget of EUR 37 320 720.79.
	Implementation body	CRES
	Supervisory Authority	Ministry of Environment, Energy and Climate Change

ENERGY EFFICIENCY NATIONAL FUND, FINANCING AND TECHNICAL SUPPORT (ARTICLE 20 OF THE DIRECTIVE).

Although the establishment and operation of an energy efficiency national fund has not been legislated for, its duties may be exercised by the Green Fund. The powers of the Green Fund include, among others, all the powers provided for in Article 9(5) of Law 3855/2010. More specifically, programmes and measures to improve energy efficiency may be subsidised, and the market for energy services or energy efficiency improvement measures may be developed in order to meet the objectives of the national energy policy for the rational use and conservation of energy. In particular, the Fund encourages investments and supports any kind of activities aiming at energy savings, the rational use of energy, limiting the use of energy-consuming production processes, and developing the market for energy services. To this end, the Fund subsidies investments and programmes related to the sustainable use of energy and sustainable development, either by using its own resources or by securing financing for business plans.

The Fund may be co-funded by Community programmes. The Fund's resources are available to all providers of energy efficiency improvement measures, such as ESCOs, independent energy consultants, energy distributors, distribution system operators, retail energy sales companies and installers, as well as the final customers.

More detailed information regarding the Green Fund is given below.

Ministerial Decision No 4503/2012 (Government Gazette, Series II, No 3184, 11/30/2012) 'Recording, systematisation, classification, programmatic and accounting separation of Green Resources, pursuant to Article 3(2) (b) of Law 3889/2010 'Financing Environmental Measures, Green Fund, Ratifying Forest Maps, and other provisions' (Government Gazette, Series I, No 182), as part of implementing Article 3 (2) of Law 3889/2010 introduced the rational allocation of the Green Fund's resources based on their institutionalisation purpose. This Ministerial Decision implemented the allocation of resources provided to address climate change and improve energy efficiency (Table 18).

Title		Financing of interventions by the Green Fund.
Measure Code		**XM1**
Description	Category	Financing mechanism
	Implementation schedule	Start: 2010
	Purpose / brief description	Law 3889/2010 establishes a comprehensive and specific financing system for environmental interventions through the establishment of the Green Fund. The purpose of the fund is to promote development through environmental protection with the management, financial, technical and financial assistance of programs, measures, interventions and activities designed to enhance and restore the environment and address climate change, to support the environmental policy and to serve the public and social interest through the administration, management and exploitation of resources, as defined in Articles 3 and 8 of said law.
	End use	Energy efficient technologies / interventions in all end-use areas
	Target group	Final consumers, natural and legal persons
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The Green Fund may finance programmes established by the Ministry of Environment, Energy and Climate Change or other Ministries and their supervised entities. The basic structure for financing programmes may include, but is not limited to: a) Priority axis specifying the national environmental strategy. b) Measures specifying priority axis. c) Actions specifying the measures, which include operations and projects implemented by the beneficiaries. The financing programme is accompanied by a planning supplement which specifies the budget and is broken down over the term of the programme.

		The recipients of financing are specified in the financing programme. The evaluation and selection criteria for operations and projects may be specified as to the nature and type of operations by programme. The criteria must include eligibility, maturity, completeness, appropriateness and consistency of the programme with the relevant national and EU policies and national and European legislation, and the managing capacity of the implementing body. Every financing programme for a budgeted expenditure, excluding VAT of an amount greater than or equal to EUR 50 000.00 shall be approved by the Minister of Environment, Energy and Climate Change, on the recommendation of the Board of Directors of the Green Fund. Every financing programme for a budgeted expenditure, excluding VAT, of an amount less than EUR 50 000.00 shall be approved by decision of the Board of Directors of the Fund. These decisions shall set the amount and method of payment of the grants or loans and the procedures and conditions for payment and any other issue relating to the implementation of the programmes. Before approving any programme, a summary of the programme and its individual data (such as categories of actions, timeframe, financial planning, categories of beneficiaries), and any other relevant details shall be posted on the Green Fund's website. Anyone may submit comments on the proposed programme. Contributions as defined in Article 3 of Law 3889/2010 shall also constitute resources of the Green Fund.
	Budget and funding	Resources of the Green Fund: (a) Green Resources (resources of the Special Fund for the Implementation of Regulatory and Planning Projects (ETERPS), resources of the Special Forestry Agency, resources of the Environmental Balance Fund, (b) contributions of energy distributors, distribution system operators and energy retailers, (c) any other charge, tax, duty, levy, income or resources which have been established in whole or in part in favour of the Special Fund for the Implementation of Regulatory and Planning Projects, b) funding from programmes and initiatives of the European Union and international organisations,

		(e) profits, interest or other income derived from participation of the Green Fund in other private entities, (f) grants and donations by natural or legal persons of public or private law, (g) any kind of contributions, donations, sponsorships, legacies, bequests from public or private bodies or from other domestic or foreign legal or natural persons, (h) revenue from the management, operation and utilisation of movable and immovable property, (i) grants from the State budget and funding from the public investment programme, (j) any other income from a legitimate source. The Green Fund utilises the Green Resources through programmes to finance initiatives for the conservation, upgrading and rehabilitation of the environment which are implemented by third parties (implementing bodies). The contribution from the Green Fund may take the form of grants, loans, capital contributions or other equivalent forms of capital support. These actions may be financed or supported at the same time by other public or European sources and/or private funds or by the European Investment Bank or other agencies.
	Implementation	Ministry of Environment, Energy and Climate Change, Green Fund

Table 18: Allocation of resources provided to address climate change and improve energy efficiency.

S/N	RESOURCE	NATURE	ALLOCATION PURPOSE	COLLECTION PROCEDURE
1	Article 20 of Law 3468/2006 (as amended by Article 11 of Law 3851/2010 and replaced by Article 29 of Law 3889/2010), fine for violating the obligation to report data and information on the functioning of RES plants by their operators.	Fine		Authorisation for the issue of a Ministerial Decision determining the procedure for imposing fines, the criteria on which they are calculated, the procedure for the submission and examination of objections to the decision to impose fines, as well as any other pertinent issue. Issuance of the Ministerial Decision is pending.
2	Article 25 paragraph A.1 of Law 3468/2006 (as amended by Article 7 of Law 3851/2010), 3% of the Special Duty specifically, 0.3% of the sale price of electricity, excluding VAT, to the Grid or System Operator, paid by producers of electricity from RES for the operation of a commercial RES-based power plant.	Duty		These amounts are withheld and allocated by the competent Operator. Within the first two months of each year, the relevant Operators inform the Minister for Environment, Energy and Climate Change in writing of the amounts paid to each beneficiary during the previous year. Authorisation to issue a Joint Ministerial Decision determining the procedure and all issues pertaining to the implementation

S/N	RESOURCE	NATURE	ALLOCATION PURPOSE	COLLECTION PROCEDURE
				of Article 25. Issuance of the Joint Ministerial Decision is pending.
3	Article 25 paragraph A.2 of Law 3468/2006 (as amended successively with Article 7(2) of Law 3851/2010, Article 30(9) of Law 3889/2010, Article 196(2) of Law 4001/2011, Article 39(2) of Law 4062/2012), revenues from the auctioning of unsold greenhouse gas emission allowances. [This resource is collected in principle by the ITSO, but the law includes authorisation for a ministerial decision to require the allocation and reimbursement of part of the resource to the Green Fund.]	Auctioning price	For the period 2013-2020, at least 50% of total revenues from the auctioning of greenhouse gas emission allowances should be used to reduce greenhouse gas emissions, to develop renewable energy sources, to increase afforestation, to enhance energy efficiency, (JMD 54409/2632/2004 No 7e, as supplemented with Article 2(13) of JMD ΗΠ57495/ 2959/E103/2010, Government Gazette, Series II, No 2030). The exact amount which will be allocated for these purposes will be specified by JMDs.	Joint Ministerial Decision 187497/8.6.11 (Government Gazette, Series II, No 1182): 5% of revenues from the auctioning of greenhouse gas emission allowances are allocated to the Green Fund and are credited by the auctioneer, the Bank of Greece, to account 266 338 'Special Fund for the Implementation of Regulatory and Planning Projects (ETERPS)'

S/N	RESOURCE	NATURE	ALLOCATION PURPOSE	COLLECTION PROCEDURE
4	Article 9(5) of Law 3855/2010, contributions of energy distributors, distribution system operators and retail energy sales companies to the Green Fund.	Contribution	Article 9 of Law 3855/2010. Subsidy for programmes and other measures to improve energy efficiency, development of the market for energy services, etc., with a view to attaining the objectives of the national energy policy.	
5	Article 9(2) of Law 3661/2008 , as replaced by Article 10(8) of Law 3851/2010, fiscal stamp for enrolment in and management of the Energy Inspectors Registers.	Fiscal stamp		Collection by Tax Office and reimbursement to the Green Fund.

MEASURES ON THE ENERGY EFFICIENCY OF BUILDINGS

EXAMINATION OF REQUIREMENTS ARISING FROM THE, RECASTING OF DIRECTIVE 2010/31/EU

Directive 2010/31/EU of the European Parliament was transposed into national law by Law 4122/2013 'Energy efficiency of buildings – transposing Directive 2010/31/EU of the European Parliament and of the Council, and other provisions' (Government Gazette, Series I, No 42, 19-02-2013).

Article 9(2) of this law provides for establishing a national plan to increase the number of nearly zero-energy buildings, which may include different goals depending on the category of use of the building, and notifying it to the European Commission.

A study is currently being prepared in accordance with the reporting requirements set out in the EPBD Directive (2010/31/EU). Specifically, the study will :

- specifications of the technical characteristics of nearly-zero energy buildings, taking into account national, regional or local conditions, including an indicator of primary energy use in kilowatt-hours per square meter per year (kWh/m2/year),
- intermediate targets for improving the energy efficiency of new buildings by 2015,
- information on the policies and financial or other measures taken to promote nearly-zero energy buildings, including details of national requirements and measures for the use of energy from renewable sources in new buildings and existing buildings undergoing major renovation,
- methodology for identifying the optimal level in terms of costs to meet minimum energy efficiency criteria as defined in the Greek Regulation on the Energy Performance of Buildings (KENAK).

Moreover, Article 10(2) of Law 4122/2013 provides for measures, funding programmes and other means to improve the energy efficiency of new and existing buildings. In establishing incentives, the cost-optimal energy efficiency levels along with the costs and benefits of energy efficiency investments to society are taken into account. The joint decision of the Ministers for Finance, Environment, Energy and Climate Change and of any other competent minister, specifying the measures stated in Article 10(2), is pending.

Finally, Articles 14 and 15 of Law 4122/2013 set out the method for carrying out inspections of heating and air conditioning systems, respectively.

BUILDING RENOVATION STRATEGY (ARTICLE 4)

This section presents the measures to encourage investments in the renovation of residential and tertiary sector buildings.

Table 19: Policy measures for the renovation of buildings.

No	Title of measure	Final use targeted	Start
K1	Regulation on the Energy Performance of Buildings	Specifications on the design, envelope and electromechanical installations of buildings	Since 2010
K2	'Saving Energy at Home'	Energy consumption for domestic hot water, heating-cooling	Since 2011
K3	Mandatory installation of solar thermal systems in new residential buildings.	Energy consumption for domestic hot water	Since 2011
K4	Energy upgrading of social housing buildings- 'Green Pilot Urban Neighbourhood' programme	Total energy consumption	Since 2011
K5	Compulsory installation of solar thermal systems in tertiary sector buildings	Energy consumption for domestic hot water	Since 2011
K6	Strengthening SMEs active in manufacturing, tourism and trade - services'	Total energy consumption	Since 2013

Title		Regulation on the Energy Performance of Buildings
Measure Code		**K1**
Description	Category	Legislation
	Implementation schedule	Start: 2010
	Purpose/brief description	Law 3661/2008 'Measures to reduce energy consumption in buildings and other provisions' (Government Gazette, Series I, No 89, 19-05-2008) harmonises Greek legislation with Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings (OJ L1, 4.1.2003). Law 3661/2008 incorporates all the provisions of the Directive, provides for the adoption of a Regulation on the Energy Performance of Buildings and distinguishes five main themes: definition of minimum energy performance requirements and the method for calculating energy performance (Article 3) of new and existing buildings (Articles 4 and 5), issue of energy performance certificate (Article 6), inspections to boilers and air-conditioning systems (Articles 7 and 8), provision of qualified and accredited energy inspectors (Article 9).
	End use	Specifications on the design, envelope and electromechanical installations of buildings
	Target group	All new buildings with a total surface area of more than 50 m^2 and existing buildings undergoing major renovation.
	Regional application	All of Greece
Information on implementation	List and description of energy saving	The regulation on the energy performance of buildings (KENAK) introduced an integrated energy design in the sector of buildings to improve the energy efficiency of buildings, energy savings and environmental protection through specific actions:

	measures	1. Preparation of a study on the Energy Performance of Buildings 2. Establishing of minimum requirements for energy efficiency in buildings 3. Energy Rating of Buildings (Energy Performance Certificate) Energy inspections to buildings, boilers and heating and air conditioning systems The Study on the Energy Performance of Buildings replaces the study on heat insulation and is be prepared for every new or existing building (over 50m^2), which undergoes a complete renovation and is be based on a specific methodology covering: (a) the requirement to meet minimum standards on the design, envelope and electromechanical installations of buildings and (b) its comparison with the reference building. Reference building means a building with the same geometry, position, orientation, use and operating characteristics as the building concerned, which also meets minimum standards and has specific technical characteristics. The Energy Performance Certificate is valid for ten years and applies to all buildings with a surface area of more than 50m^2, either new or existing, which undergo complete renovation, existing buildings with a surface area of more than 50m^2 or parts thereof, when they are sold or leased, and all public sector buildings. The requirement for an Energy Performance Certificate in case of purchase, sale and lease of buildings, applies as of 9 January 2011. The Energy Performance Certificate includes, among other things, the results of the evaluation by the energy inspector and recommendations for improving the energy efficiency of the building, so that consumers are able to compare and evaluate their actual consumption and any opportunities for improving energy performance. The issue of certificate is mandatory. Energy inspection is an important tool for identifying the energy condition of existing buildings and its potential for improvement, as well as for verifying the implementation of legislation on energy efficiency of new buildings. A private energy inspector, who is in the YPEKA Energy Inspectors Register, must inspect the building and place it in an energy category based on the ratio of the building's consumption to the reference building's consumption.

		Verification of the proper implementation of the institutional framework shall be carried out by the Energy Inspection Departments of Northern and Southern Greece of the Environment, Building, Energy and Mining Inspectorate of YPEKA.
	Budget and funding	
	Implementation body	Verification of the proper implementation of the institutional framework shall be carried out by the Energy Inspection Departments of Northern and Southern Greece of the Environment, Building, Energy and Mining Inspectorate of YPEKA
	Supervisory Authority	Ministry of Environment, Energy and Climate Change, Technical Chamber of Greece

Title		'Saving Energy at Home'
Code of measure		**K2**
Description	Category	Financial incentives
	Implementation schedule	Start: 2011
	Purpose/brief description	The '**Saving Energy at Home**' programme aims at providing financial incentives for energy-saving interventions in the residential building sector with a view to reducing energy needs. The types of housing that can be subsidised by the programme are: ➢ Single-family houses ➢ Apartment blocks - for the part of the block which relates to all the apartments in the building ➢ Individual apartments The types of apartments must meet the following criteria: ➢ must be located in areas with a price band lower or equal to EUR 2 100/m2, as this has been designated until 31 December 2009; ➢ must have a building permit; ➢ must be included under the Energy Performance Certificate (EPC) in class D or lower; ➢ must not have been scheduled to be demolished. The proposal (combination of interventions) for energy upgrade which are submitted with the application should cover the following requirement which is the minimum energy objective of the Programme: it must upgrade by at least one energy class or, alternatively, provide an annual primary energy savings greater than 30% of the reference building consumption (kWh/m2).

		To make sure that this requirement is met, the materials and systems to be used for the interventions must be energy certified. Moreover, building materials and electromechanical systems which are subject to a relevant requirement under applicable law, should bear the CE mark.
	End use	Energy consumption for domestic hot water, heating-cooling
	Target group	Existing residential buildings included under the Energy Performance Certificate (EPC) in class D or below
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The eligible categories of interventions for improving energy efficiency are: 1. Replacing window frames / glass panes and installing shading systems 2. Installing thermal insulation in the building envelope, including the roof and pilotis (open parking space in place of the ground floor) 3. Upgrading the heating and domestic hot water system The income categories of beneficiaries are as follows: Category A1: Beneficiaries whose individual or family declared income does not exceed EUR 12 000.00 or EUR 20 000.00 respectively. The incentives offered in this category include a loan of 30% with 100% interest subsidy and a grant of 70% of the final eligible budget, as established after the second energy inspection. Category A2: Beneficiaries whose individual declared income is greater than EUR 12 000.00 and no more than EUR 40 000.00 or whose family income is greater than EUR 20 000.00 and no more than EUR 60 000.00. The incentives offered in this category include a loan of 65% with 100% interest subsidy and a grant of 35% of the final eligible budget, as established after the second energy inspection.

		Category B: Beneficiaries whose individual declared income is greater than EUR 40 000.00 and no more than EUR 60 000.00 or whose family income is greater than EUR 60 000.00 and no more than EUR 80 000.00. The incentives offered in this category include a loan of 85% with 100% interest subsidy and a grant of 15% of the final eligible budget, as established after the second energy inspection.
	Budget and funding	The programme is financed by the European Union (European Regional Development Fund (ERDF)) and by National Resources, through the Regional Operational Programmes (ROP) and the Operational Programme 'Competitiveness and Entrepreneurship' (OPCE) and Environment and Sustainable Development' (OPESD) under the NSRF 20072013. • Budget: EUR 548,2 million • Eligible budget per beneficiary application < EUR 15 000.00 The total expenditure for the cost of both energy inspections, and the cost of the project consultant, are covered by the programme provided that the application is accepted and the energy target set in the application is met.
	Implementation body	Special Managing Service of the Operational Programme 'Competitiveness and Entrepreneurship' (EYD-EPAE)
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	By September 2014, approximately 70 thousand applications to join the programme had been submitted. Out of them, 48 thousand have already joined, and more than 33 thousand have even completed the energy efficiency improvement interventions with a total eligible budget of EUR 325.5 million. The budget breakdown by category of energy upgrading interventions of completed applications is: *1.* Replacing window frames / glass panes and installing shading systems:

		EUR 106 million 2. Installing thermal insulation in the building envelope, including the roof and pilotis: EUR 49 million 3. Upgrading the heating and domestic hot water system: EUR 55 million The implementation of these interventions is expected to result in total annual primary energy savings of approximately 31.3 ktoe.

Title		Mandatory installation of solar thermal systems in new residential buildings
Code of measure		**K3**
Description	Category	Legislation
	Implementation schedule	Start: 2012
	Purpose/brief description	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending on the climatic conditions in each area, the load and the position of the building.
	End use	Energy consumption for domestic hot water, heating-cooling
	Target group	New residential buildings
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	Article 8(3)(f) of Ministerial Decision D6/B/oik.5825/09.04.2010 'Adoption of Regulation on the Energy Performance of Buildings', and Article 10(3) of Law 3851/2010 'Accelerating the development of Renewable Energy Sources to address climate change and other provisions relating to issues with the competence of the Ministry of Environment, Energy and Climate Change' (Government Gazette, Series I, No 85, 04-06-2010), requires the use of solar thermal systems to cover part of hot water needs. The minimum percentage of the solar share on an annual basis is set at 60%.
	Budget and funding	
	Implementation body	The local competent Building Departments

	Supervisory Authority	Ministry of Interior, Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness

Title		**Energy upgrading of social housing buildings- 'Green Pilot Urban Neighbourhood' programme**
Code of measure		**K4**
Description	Category	Financial incentives
	Implementation schedule	Start: 2011
	Purpose/brief description	The objective of the programme is to upgrade four industrial buildings to nearly zero energy buildings and optimise the local microclimate.
	End use	Total energy consumption of the target group
	Target group	Social housing buildings
	Regional application	Attica Basin
Information on implementation	List and description of energy saving measures	The programme will present the pilot-demonstration and innovative implementation of integrated development and implementation of green and sustainable urban housing units, which are occupied by low-income citizens, and are part of an optimized urban environment. Main criteria for the selection of neighbourhoods was the economic level of residents, the potential energy savings in the buildings and the prospects for significant improvement of the local microclimate. The implementation plan of projects for each neighbourhood includes the following stages: Stage 1: Information, social and business awareness and involvement Stage 2: Energy recording of buildings and microclimate conditions Stage 3: Energy study and drafting of specifications issue

		Step 4: Tender notice for the projects Step 5: Evaluation of proposals and selection of contractors Stage 6: Construction, supervision and delivery of project Stage 7: Evaluation of benefits and demonstration activities This programme is based on voluntary agreements.
	Budget and funding	The budget of the programme amounts to EUR 7 million. It will be financed with the participation and contribution of many Greek industries and commercial companies, which are fully financing parts of the project under voluntary agreements signed, and through the Operational Programme 'Environment and Sustainable Development' (OPESD)
	Implementation body	CRES
	Supervisory Authority	Ministry of Environment, Energy, and Climate Change

Title		Compulsory installation of solar thermal systems in the buildings of the tertiary sector
Measure Code		K5
Description	Category	Legislation
	Implementation schedule	Start: 2011
	Purpose/brief description	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending on the climatic conditions in each area, the load and the position of the building.
	End use	Energy consumption for domestic hot water, heating-cooling
	Target group	Tertiary sector building installations
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	Article 8(3)(f) of Ministerial Decision D6/B/oik.5825/09.04.2010 'Adoption of Regulation on the Energy Performance of Buildings' and Article 10(3) of Law 3851/2010 'Accelerating the development of Renewable Energy Sources to address climate change and other provisions relating to issues with the competence of the Ministry of Environment, Energy and Climate Change', require the use of solar thermal systems to cover part of hot water needs. The minimum percentage of the solar share on an annual basis is set at 60%.
	Budget and funding	-
	Implementation body	The local competent Building Departments
	Supervisory Authority	Ministry of Interior, Ministry of Finance, Ministry of Development and Competitiveness, Ministry of Environment, Energy and Climate Change,

Title	Strengthening SMEs active in manufacturing, tourism and trade - services'	
Measure Code		**K6**
Description	Category	Financial incentives
	Implementation schedule	Start: 2013
	Purpose/brief description	The programme '**Strengthening SMEs active in manufacturing, tourism and trade - services'** aims to provide support to micro-enterprises, small and medium-sized enterprises, whether they are existing, new or in the process of being established, which are making investments which are oriented towards innovations, the environment and information technology. The Programme is open to: ➢ Existing enterprises that, by 31 December 2011, have two or more closed fiscal years with a duration of at least twelve months and which, among other requirements, must have their declared KAD(s) before the submission of the proposal. ➢ New enterprises/enterprises in the process of becoming established that must have their declared KAD(s) before the submission of the proposal. Enterprises in the process of becoming established must have their declared KAD(s) before the first disbursement of the grant.
	End use	Total energy consumption
	Target group	Existing and new enterprises/enterprises in the process of becoming established which are active in manufacturing, tourism and trade-services
	Regional application	All of Greece
Information on implementation	List and description of the	Procurement costs for environmental protection and energy saving equipment and installations are eligible under the programme. Examples of operations eligible for funding are:

	energy saving measures	(1) 1) Building works, electromechanical and specialised installations, directly either to energy savings or environmental protection, in production, storage, distribution and administration areas of undertakings: ➢ Upgrading the central heating system to an environmentally friendly one ➢ Replacing glass panes and/or panels with new energy efficient ones that meet the requirements of the Regulation on the Energy Performance of Buildings ➢ Heat insulation of buildings ➢ Planted flat roofs ➢ Insulation of heating/cooling transmission networks (2) Purchase - transport - installation of environmental protection equipment and systems: ➢ Installation of a RES system or heat pumps for hot water production and/or heating/cooling purposes ➢ Replacing old burner/boiler systems with a new high efficiency one or a natural gas system ➢ Equipment and operations to reduce water consumption, ➢ Equipment and operations for liquid and solid waste management, ➢ Equipment and operations to reduce air pollutants and nuisance, Equipment and operations on reducing soil, subsoil, water and air pollution, ➢ Equipment and operations related to energy production from environmentally friendly technologies (solar, wind, geothermal, etc.) and energy storage, ➢ Equipment and operations to upgrade the energy efficiency of the air conditioning system, ➢ Equipment and operations to facilitate the use of a hybrid ventilation system with ceiling fans, ➢ Equipment and operations to facilitate the use a mechanical ventilation system (free cooling), ➢ Replacing electrical/electronic devices with new ones in energy class A, ➢ Installing a lighting control system with motion sensors, ➢ Installing external shading,

		➢ Installing an energy management system, ➢ Purchasing electric vehicles for use in the business premises.
	Budget and source of financing	Programme budget: EUR 456 million The Action is financed by the Regional Operational Programmes of Macedonia - Thrace, Western Greece Peloponnese - Ionian Islands, Crete and the Aegean Islands, Thessaly - Mainland Greece - Epirus, Attica. Financing is granted to projects with a maximum eligible budget of EUR 30 000.00 to EUR 300 000.00 in the area of 'Manufacturing', of EUR 20 000.00 to EUR 300 000.00 in 'Tourism' and of EUR 20 000.00 to EUR 100 000.00 in 'Trade -Services' . The percentage of public funding is determined by the place where the investment is made, and by the size of the enterprise (medium and small and micro enterprises). Application submission period: 25/2/2013-16/5/2013
	Implementation body	Special Managing Service of the Operational Programme 'Competitiveness and Entrepreneurship', Intermediate Body of the Operational Programme 'Competitiveness and Entrepreneurship' (EFEPAE) and Regions
	Supervisory Authority	Ministry of Development and Competitiveness

ADDITIONAL MEASURES TO ADDRESS THE ISSUE OF ENERGY EFFICIENCY OF BUILDINGS AND APPLIANCES

This section presents additional measures to improve energy performance in buildings, and measures to promote the use of energy efficient appliances and equipment in buildings.

Title		Energy labelling of appliances and minimum energy efficiency requirements
Measure Code		**ΚΣ1**
Description	Category of measure	Legislation Provision of information and obligatory information measures
	Implementation timeframe	Start: 2008
	Purpose / brief description	Energy labelling of appliances is aimed at informing consumers about the electricity consumption and the energy efficiency rating of these appliances, and the requirement for a minimum energy efficiency of appliances ensures a significant reduction of both energy and environmental costs incurred by consumers.
	End use category	Energy consumption of electrical and electronics appliances
	Target group	• The general public. • Residential • The public and tertiary sectors.
	Regional application	All of Greece.
Information on implementation	List and description of energy saving measures	Article 7 of Joint Ministerial Decision Δ6/B/14826/17-06-2008 'Measures to improve energy efficiency and energy savings in the central and the general government' (Government Gazette, Series II, No 1122, 17-06-2008) stipulates that the appliances procured by entities of the public sector must bear an energy mark and a certified energy efficiency label, and sets the minimum energy requirements for specific types of appliances. Ministerial Decision D6/7094/23-05-2011 'Framework methodology for measuring and verifying energy savings for achieving the national indicative energy savings target in end use - List of indicative eligible measures to improve energy efficiency-Energy content of fuels for end use (Government Gazette, Series II, No 918, 23-05-2011) includes the energy labelling schemes in the list of indicative eligible measures to improve energy efficiency.

		The Regulatory Authority for Energy (RAE) implemented a national campaign programme with the slogan 'actively engaged' to raise awareness of savings and energy savings issues. Declaration by the Ministry of Development of the years 2005-2010 as energy savings years. Under this initiative, two information campaigns were organised involving the distribution of: A. three leaflets entitled: 1. 'Saving energy for a better quality of life and a clean environment.' 2. 'Drive economically: Seven golden rules for fuel economy.' 3. 'Heating-Cooling: Saving energy without compromising comfort.' B. leaflets entitled: 'Energy saving. He who knows, gains.'
	Budget and funding	
	Implementation body	Regions
	Supervisory Authority	Ministry of Development and Competitiveness, Ministry of Finance, Ministry of the Interior

ENERGY PERFORMANCE OF PUBLIC BODIES' BUILDINGS (ARTICLES 5 AND 6)

CENTRAL GOVERNMENT BUILDINGS (ARTICLE 5)

The list of heated and/or cooled central government buildings in accordance with Article 5 of Directive 2012/27/EC was posted on YPEKA's website on 31 December 2013. The list contained heated and/or cooled buildings of central government with a total useful floor area of over 500 m^2.

The identification of the bodies of the central government was based on the definition of the Central Administration provided in Article 2 of Law 3871/ 2010 'Financial management and accountability' (Government Gazette, Series I, No 141) in accordance with which the Central Government is comprised by the Presidency of the Republic, the Ministries, the Decentralised Administrations and the Independent Authorities.

The list was drafted based on information from the Special Department for Strategic Planning, Coordination and Implementation of Programmes (EYSSEP) of the Ministry of Administrative Reform and E-Governance, as derived from a project deliverable implemented under the Administrative Reform Operational Programme entitled 'Recording and Analysis of Current Situation' and involves the recording of the central government's building infrastructure, with sufficient identification data, taking into account changes that have occurred in ownership due to the sale by the Hellenic Republic Asset Development Fund (HRADF). This process resulted in the drafting of a final list of 82 buildings, with a total floor area of 309 712 m^2.

OTHER PUBLIC BODIES' BUILDINGS (ARTICLE 5)

Article 5(7) of the Directive sets the necessary framework for public bodies at regional and local level to be encouraged to play an exemplary role as regards energy efficiency of buildings. Table 20 shows the number of measures implemented to fulfil this obligation.

Table 20: Measures for energy upgrade of public buildings

No	Title of measure	Final use targeted	Start
ΔΚ1	Integrated energy planning by local authorities and Covenant of Mayors	Total energy consumption of the target group Fuel consumption in transport	Since 2009
ΔΚ2	Energy saving interventions in public buildings	Final energy consumption of the buildings in the target group	Since 2010
ΔΚ3	Interventions for improving energy efficiency in school buildings	Final energy consumption in new or under construction school buildings	Since 2011
ΔΚ4	Green flat roofs in public buildings	Energy consumption for cooling-heating	Since 2011
ΔΚ5	Compulsory installation of central solar thermal systems to meet hot water requirements	Energy consumption for domestic hot water, heating-cooling	Since 2011
ΔΚ6	Compulsory replacement of all low energy efficiency light fittings in the public sector and the wider public sector	Energy consumption for lighting	Since 2006
ΔΚ7	Intelligent Nearly Zero Energy Theme Museums	Total energy consumption	Since 2012
ΔΚ8	Energy managers in public sector and general government buildings	Total energy consumption	Since 2014

Title		Integrated energy planning by local authorities and Covenant of Mayors
Code of measure		**ΔΚ1**
Description	**Category**	Subsidy Exemplary role of the public sector
	Implementation schedule	Start: 2009
	Purpose/brief description	The purpose of the **'ENERGY EFFICIENCY' (ΕΞΟΙΚΟΝΟΜΩ)** Programme is the implementation of actions and proven best practices for reducing energy consumption in the urban environment, with emphasis on the building sector (municipal buildings of 1st grade local authorities) and the upgrade of public spaces, on one hand, and in the area of municipal and private transport and energy intensive municipal facilities, on the other, through the implementation of technical interventions and actions to raise awareness and mobilise citizens, the local government, businesses and bodies. The call for continuation of the **'ENERGY EFFICIENCY' (ΕΞΟΙΚΟΝΟΜΩ)** Programme was published in March 2012. The **'ENERGY EFFICIENCY II' (ΕΞΟΙΚΟΝΟΜΩ ΙΙ)** Programme provides financing to energy saving interventions in existing municipal buildings and infrastructure of 1st grade local authorities, including open building facilities (swimming pools, sports facilities etc.). It does not grant funding to projects launched by municipalities or municipal units (municipalities formerly included in the 'Kapodistrias' plan) which are subsidised by the **'ENERGY EFFICIENCY'** Programme. The programme **'Standard demonstration projects on the use of Renewable Energy Sources and Energy Saving Actions in new, under construction or existing buildings, gyms and swimming pools owned by local authorities and municipal enterprises of local authorities'** grants financing to demonstration projects using Renewable Energy Sources and Energy Saving Actions in new, under construction or existing buildings, gyms and swimming pools owned by local authorities and municipal enterprises of local authorities. Furthermore, the participation of Greek municipalities in the European initiative 'Covenant of Mayors' which aims at integrated energy planning at the local level and achieving specific environmental objectives is supported and promoted both at central and at regional level.

	End use	Total energy consumption of the target group Fuel consumption in transport
	Target group	The 'ENERGY EFFICIENCY' programme involves 1st grade local authorities (municipalities) with a population of over 10,000 residents (based on the census of the National Statistical Service of Greece as of 2001), and capitals of prefectures regardless of population criteria. The **'ENERGY EFFICIENCY II'** programme, on the contrary, is addressed to all 1st grade local authorities except those that have joined the **'ENERGY EFFICIENCY'** programme.
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	The **'ENERGY EFFICIENCY'** programme is made up of the following selected priority axes: Axis 1: Interventions to existing municipal buildings ➢ Energy upgrade of the building envelope (exterior insulation, replacement of glazing and window frames, installing roofing, awnings and special coatings to provide protection from the sun) ➢ Energy upgrade of electro-mechanical heating and cooling installations ➢ Upgrade of the natural/ artificial lighting system ➢ Installing an energy management system Axis 2: Interventions to public areas of the urban environment ➢ Integrated energy saving and management interventions in municipal lighting ➢ Bioclimatic interventions to improve microclimate and energy efficiency in urban areas. Axis 3: Interventions in urban transport

		➢ Interventions in municipal fleet vehicles to improve their energy efficiency ➢ Urban mobility studies ➢ Transport studies Axis 4: Interventions in municipal technical infrastructure Axis 5: Dissemination, networking and information actions The following actions are financed by the 'ENERGY EFFICIENCY' programme: (1) Energy upgrade of the building envelope, including all relevant operations ➢ Installing thermal insulation (building envelope, bearing structure, flat roof, roof, floor, walls) ➢ Replacing old windows, doors, window frames and glass panes ➢ Use of special coatings (cool materials) on roofs and facades ➢ Installing external shading ➢ Natural/night ventilation ➢ Installing/integrating passive solar systems (2) Energy upgrade of electro-mechanical installations, including all relevant operations ➢ Upgrade of the central heating system, including compensation systems in the burner-boiler in combination with pipe insulation ➢ Upgrade of the air-conditioning system ➢ Upgrade of pumps-motors ➢ Mechanical ventilation ➢ Hybrid ventilation with ceiling fans ➢ Installation of renewable energy systems to cover heat loads (solar thermal systems, shallow geothermal energy, etc.) (3) Upgrade of the natural/ artificial lighting system (4) Installation of an energy management system, including all relevant operations ➢ Measuring, monitoring, recording, processing, control and viewing systems -

		on site and online - for the operating data and results of the building energy management systems (BEMS) ➢ Data visualisation systems (5) Interventions in the energy upgrade of technical infrastructure/ other facilities of LAs, including all relevant operations ➢ Energy upgrade of open sports grounds ➢ Energy upgrade of sewage treatment plants, pumping stations, etc. It is also possible to finance Energy Efficiency Designs, to conduct energy inspections and to implement publicity actions. The actions that may be financed under the programme **'Standard demonstration projects on the use of Renewable Energy Sources and Energy Saving Actions in new, under construction or existing buildings, gyms and swimming pools owned by local authorities and municipal enterprises of local authorities'** include: I) The comprehensive and complete construction of new bioclimatic buildings under KENAK II) RES Actions (photovoltaic facilities, central solar thermal hot water systems, shallow geothermal energy systems, construction of a high efficiency cogeneration of heat and power facility, construction of a facility for making use of the heat produced from the CHP and/or RES facility for cooling purposes, other RES systems for heat and cooling energy and heat pumps, biomass combustion facilities, connection to a public electricity distribution network or storage facilities) III) Energy upgrade actions and energy saving actions in new buildings under construction. In particular the following actions may be financed: ➢ Installing insulation ➢ Replacing window frames and glass panes with new certified, energy-efficient ones

		➢ Replacing burner systems/boilers/piping with a RES, natural gas, LPG system ➢ Replacing old central or split air conditioning systems with new central high-efficiency ones ➢ Interventions for a compensation system in the burner/boiler and insulation of pipes ➢ Replacement of existing old technology PV systems (more than 5 years old) with new systems of documented higher energy efficiency ➢ Passive solar systems ➢ Solar chimneys ➢ Passive natural and artificial energy lighting ➢ Natural and mechanical ventilation and cooling systems and techniques ➢ External sun protection and shading systems ➢ Roof planting ➢ Central or split-type high-efficiency air-conditioning systems ➢ Installation of systems for measuring, monitoring, recording, processing and viewing - on site and online - of the operating data and results of the building energy management systems (BEMS) ➢ Connections with the public natural gas distribution network and construction of an internal network ➢ Other permanent energy interventions of innovative technology to improve the energy performance of buildings Regarding participation in the '**Covenant of Mayors'**, 88 municipalities have signed for the moment and have joined in this initiative, and are now bound to achieve results exceeding the EU targets for reducing CO_2 emissions through measures to

		promote energy efficiency and renewable energy sources. Among them, 54 municipalities have already proceeded to Reference Emission Inventory and have submitted the relevant local Sustainable Energy Action Plan - SEAP, whereby the following are proposed: ➢ overall emission reduction measures in public buildings, infrastructure, public lighting, transport ➢ integration of RES at municipal level ➢ dissemination and awareness raising to improve energy efficiency in the private sector ➢ creation of new structures within the local authorities to implement, monitor and record the implementation of the measures under the programme 23 Action Plans have already been accepted by the European Commission, whereas 31 Action Plans are in the evaluation process. It is noted that support structures and the agencies that coordinate these efforts have already been developed. More specifically, coordinating agencies of the Covenant are: ➢ the Centre for Renewable Energy Sources (CRES) ➢ the Region of Central Macedonia ➢ the Region of Crete ➢ the Region of Attica ➢ the Region of Western Macedonia ➢ Technical Chamber of Greece Respectively, the agencies supporting the Covenant are: ➢ the Sustainable Aegean Islands Network (Daphne) ➢ the Regional Association of Municipalities of Central Greece ➢ the Regional Association of Municipalities of Attica ➢ the Central Union of Municipalities of Greece ➢ the Network of Twinned Towns with Lakes.

		Furthermore, financing tools for both the design and implementation of SEAP are promoted at the national level by local authorities participating in the above initiative.
	Budget and funding	The total budget for the **'ENERGY EFFICIENCY'** programme stands at EUR 100 million and is covered by the National Strategic Reference Framework (NSRF) 2007-2013 and the Operational Programme 'Competitiveness and Entrepreneurship'. Respectively, the total budget for the **'ENERGY EFFICIENCY II'** programme stands at EUR 75 million and is covered by the National Strategic Reference Framework (NSRF) 2007-2013 and the Operational Programme 'Environment and Sustainable Development'. In both programmes, the maximum budget for each local authority is determined by the population of each municipality. The total budget for the programme **'Standard demonstration projects on the use of Renewable Energy Sources and Energy Saving Actions in new, under construction or existing buildings, gyms and swimming pools owned by local authorities and municipal enterprises of local authorities'** stands at EUR 25 million and is 100% covered by the National Strategic Reference Framework (NSRF) 2007-2013.
	Implementation body	CRES (Intermediate Body for the 'ENERGY EFFICIENCY' programme), local authorities and municipal enterprises of local authorities
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	104 municipalities have joined the **'ENERGY EFFICIENCY'** programme and will implement energy efficiency improvement actions leading to primary energy savings of around 5.96 ktoe. 2.35 ktoe will derive from interventions in existing municipal buildings, 2.56 ktoe from interventions in public lighting and 1.05 ktoe from actions involving other technical municipal infrastructure. 55 municipalities have already joined the **'ENERGY EFFICIENCY'** programme, with an expected primary energy savings of around 3.15 ktoe because of interventions to be implemented in existing municipal buildings.

		In total, 2 local authorities have joined the programme **'Standard demonstration projects on the use of Renewable Energy Sources and Energy Saving Actions in new, under construction or existing buildings, gyms and swimming pools owned by local authorities and municipal enterprises of local authorities'** with a total budget of EUR 18.7 million. The implementation of interventions is expected to lead: ➢ to an average energy saving of about 47.6%; ➢ to an average percentage of reduction of greenhouse gas emissions of 50.4%; ➢ to a total greenhouse emissions reduction of 0.5 kt $CO_{2eq;}$ ➢ to the creation of 115 man-years of employment.

Title		Energy saving interventions in public buildings
Code of measure		**ΔΚ2**
Description	**Category**	Subsidy Exemplary role of the public sector
	Implementation schedule	Start: 2010
	Purpose/brief description	Implementation of energy interventions in public buildings to improve energy efficiency
	End use	Final energy consumption of the buildings in the target group
	Target group	Public buildings housing ministerial departments and public legal entities
	Regional application	All of Greece.
Information on implementation	**List and description of energy saving measures**	Projects involving heating and/or cooling energy generation from RES and energy saving will be financed under the programme **'Standard demonstration projects on the use of Renewable Energy Sources (RES) and/or Energy Saving (ES) in public buildings'** to reduce energy requirements for heating, cooling, lighting and domestic hot water. The programme aims at achieving energy savings in the central and the general government, encouraging and increasing the use of RES through standard demonstration projects, reducing air pollution and reducing emissions of gases that cause climate change. The actions to be funded include: ➢ applying heat insulation ➢ replacing window frames and glass panes

		➢ passive solar systems ➢ natural lighting and ventilation systems, external shading systems for the openings of the building ➢ mechanical cooling-ventilation systems ➢ extensive roof planting ➢ replacing burner systems/boilers with a RES, natural gas, LPG system ➢ replacing old air conditioning systems with new central high-efficiency ones ➢ interventions for a compensation system in the burner/boiler and insulation of pipes ➢ installation of measuring, data recording and monitoring systems for the energy installations in buildings. The application period was from 20 July 2010 to 15 April 2011.
	Budget and funding	Total financing: EUR 40 million Source: NSRF-OPESD
	Implementation body	All ministries, public entities (except LAs)
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	A total of 13 buildings have joined the programme with a total budget of EUR 30.5 million. The implementation of interventions is expected to lead: ➢ to an average energy saving of about 36.9%; ➢ to an average percentage of reduction of greenhouse gas emissions of 37.6%; ➢ to the creation of 246 man-years of employment.

Title		Interventions for improving energy efficiency in school buildings
Code of measure		**ΔΚ3**
Description	**Category**	Subsidy Exemplary role of the public sector
	Implementation schedule	Start: 2011
	Purpose/brief description	Implementation of projects in existing and new or under construction school buildings to improve energy efficiency
	End use	Final energy consumption in new or under construction school buildings
	Target group	Public school buildings
	Regional application	All of Greece.
Information on implementation	**List and description of energy saving measures**	The **'Bioclimatic Demonstration Schools'** programme promotes bioclimatic design interventions in new or under construction primary and secondary education schools aimed at achieving energy savings. The actions funded include: (a) constructing school buildings having fully integrated the principles of bioclimatic design, (b) supplying and installing passive and active solar systems, hybrid systems and renewable energy systems, including natural lighting and ventilation systems, solar chimneys, solar protection and shading systems and green roofs, (c) various support systems and network connections, including data metering, recording and monitoring systems for the energy systems of buildings, as well as control and operational management systems for electromechanical installations,

		(d) studies and other actions. The programme **'Standard demonstration projects on the use of RES and/or ES measures in existing public primary and secondary education school buildings'** includes projects to be implemented in existing primary and secondary education school buildings to increase heating and/or cooling energy generated from RES and energy saving by reducing energy by reducing energy requirements for heating, cooling, lighting and hot water. Actions to improve energy efficiency and rational energy management funded include: (a) installing heat insulation to building envelopes, shading, sun protection systems and other elements to improve the energy efficiency of the building envelope, (b) using special coatings, cool materials, on roofs (c) replacing window frames and glass panes with new certified, energy-efficient ones (d) passive solar heating systems (e) natural and artificial lighting systems (f) natural and/or hybrid ventilation and cooling systems and techniques (g) roof planting (h) bioclimatic interventions in the surrounding area (i) upgrading and modifying existing central heating and/or conditioning installations, premises and installations of Domestic Hot Water (DHW), (j) connections to the natural gas distribution network An essential condition of the programme is that the building will be upgraded by at least one energy class.
	Budget and funding	Total financing for the programme **'Bioclimatic Demonstration Schools'**: EUR 25 million Total financing for the programme **'Standard demonstration projects on the use of RES and/or ES measures in existing public primary and secondary education school buildings'**: EUR 40 million

		Source: NSRF-OPESD
	Implementation body	Local Authorities, Ministry of Education and Religious Affairs
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	By March 2014, 5 schools had joined the programme **'Bioclimatic Demonstration Schools'**, with a total eligible budget of EUR 17 million. 73 schools have joined the programme **'Standard demonstration projects on the use of RES and/or ES measures in existing public primary and secondary education school buildings',** with a total eligible budget of EUR 46 million.

Title		Green flat roofs in public buildings
Code of measure		**ΔΚ4**
Description	**Category**	Subsidy Exemplary role of the public sector
	Implementation schedule	Start: 2011
	Purpose/brief description	The programme **'Green roofs on public buildings' a**ims to improve the thermal, optical and environmental conditions of the users of public buildings, to familiarize citizens with the techniques, advantages and features of green roofs, to reduce energy consumption and emission of greenhouse gases and therefore, to help slowing down and reversing climate change.
	End use	Energy consumption for cooling-heating
	Target group	Public buildings
	Regional application	All of Greece.
Information on implementation	**List and description of energy saving measures**	The programme lays down the requirements for green roofs for pilot applications and the methodology to be used to select the public sector buildings where the pilot projects will be implemented. Moreover, the programme includes actions to distribute information and raise awareness.
	Budget and funding	Total financing: EUR 20 million Source: NSRF - OPESD Application submission period: 05.12.2011- 06.02.2012 After completion of the evaluation of submitted proposals, 87 proposals will be included in the programme and will be funded with a total budget of EUR 14 782 839.94.

	Implementation body	CRES
	Supervisory Authority	Ministry of Environment, Energy and Climate Change

Title		Compulsory installation of solar thermal systems to meet hot water requirements
Code of measure		**ΔΚ5**
Description	**Category**	Legislation
	Implementation schedule	Start: 2011
	Purpose/brief description	Solar thermal systems will replace 50-100% of conventional fuels and electricity, depending on the climatic conditions in each area, the load and the position of the building.
	End use	Energy consumption for domestic hot water
	Target group	New and existing central and general government buildings.
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	Article 8(3)(f) of Ministerial Decision D6/B/oik.5825/09.04.2010 'Adoption of Regulation on the Energy Performance of Buildings' and Article 10(3) of Law 3851/2010 'Accelerating the development of Renewable Energy Sources to address climate change and other provisions relating to issues with the competence of the Ministry of Environment, Energy and Climate Change', require the use of solar thermal systems to cover part of hot water needs. Also, for existing buildings, Article 8(2) of Law 3855/2010 provides that the gradual installation of central solar heating systems or other RES technologies is mandatory.
	Budget and funding	
	Implementation body	The local competent Building Departments

	Supervisory Authority	Ministry of Interior, Ministry of Finance, Ministry of Development and Competitiveness, Ministry of Environment, Energy and Climate Change,

Title		Compulsory replacement of all low energy efficiency light fittings in the public sector and the wider public sector
Code of measure		**ΔΚ6**
Description	**Category**	Legislation
	Implementation schedule	Start: 2006
	Purpose/brief description	The replacement of filament lamps by compact fluorescent lamps or by other low-consumption lamps which use 80% less energy and have a lifespan which is almost ten times longer will produce immediate substantial results. For this purpose, the following are mandatory: • replacing all low energy efficiency lighting units with high efficiency units (lamps, ballasts, reflectors, etc.). annual recording / reporting of energy interventions and redetermination of the target for further improvement.
	End use	Energy consumption for lighting
	Target group	• All central and general government buildings. • Public facilities (sports centres, etc.). • Street lighting and public lighting.
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	Joint Ministerial Decision Δ5-ΗΛ/Β/0ΙΚ.20168/2006 (Government Gazette, Series II, No 1554, 2410-2006), which provides for the replacement of light bulbs in public sector buildings and in the buildings of local authorities and supervised bodies (owned or leased), is being implemented.

		The ministerial decision stipulates compulsory replacement of all lighting units with filament light bulbs or fluorescent light bulbs in an energy efficiency class lower than B, with fluorescent light bulbs in energy efficiency class A or B with integral or external electronic ballast. Furthermore, Article 5 of Ministerial Decision Δ6/B/14826/17.06.2008 'Measures to improve energy efficiency and energy savings in the central and general government' stipulates compulsory gradual replacement of all lighting units with filament light bulbs, after the existing stock of lighting units is exhausted. Furthermore, brightness levels are specified in accordance with standard EN12464-1. Immediate implementation for the entire period 2008-2016 with the target being that the majority of light bulbs are of maximum energy efficiency (A, A+, A++).
	Budget and funding	'
	Implementation body	Public sector and general government
	Supervisory Authority	Ministry of Interior, Ministry of Development and Competitiveness, Ministry of Environment, Energy and Climate Change

Title		Intelligent Nearly Zero Energy Theme Museums
Code of measure		**ΔΚ7**
Description	**Category**	Subsidy Exemplary role of the public sector
	Implementation schedule	Start: 2012
	Purpose/brief description	The programme '**Intelligent Nearly Zero Energy Theme Museums'** aims to implement interventions which result in each building, after the proposed interventions, ideally having been converted into a Nearly Zero Energy Building, i.e. its maximum permissible primary energy consumption should not exceed 60 kWh/m2/year. More specifically, the programme aims to promote energy savings in central and general government, encouraging and increasing the use of RES through standard demonstration projects, reducing air pollution and reducing emissions of gases that cause climate change.
	End use	Total energy consumption
	Target group	Museums operating in the form of non-profit private legal entities for a public benefit purpose or museums operating in the form of non-profit civil partnerships
	Regional application	All of Greece.
Information on implementation	**List and description of energy saving measures**	The following actions can be funded by the programme: (1) Energy upgrade and saving actions

		➢ *Interventions in the building envelope:* installing thermal insulation on the building envelope, installing external shading or other sun protection systems, planting roofs, using cool or other specialised materials on roofs and/or exterior walls, replacing window frames and glass panes with new certified, energy-efficient ones, and other energy efficiency improvement measures. ➢ *Installing passive solar systems:* passive solar heating systems, daylighting systems, natural and/or hybrid ventilation and cooling systems and techniques, and other passive systems. ➢ *Bioclimatic interventions* in the surrounding area to improve microclimatic conditions and ensure environmental comfort and energy saving conditions. ➢ *Interventions for upgrading and modifying existing facilities:* central heating and/or cooling, hot water, artificial lighting, ventilation. (2) RES actions (photovoltaic installations, shallow geothermal energy, biomass combustion installations, solar thermal systems, small wind turbines, other RES exploitation systems, heating or cooling systems and heat pumps, interventions to convert the existing E/M installations to improve their functional features and performance). (3) Publicity, information and awareness-raising actions for visitors on Energy Saving (ES) and Renewable Energy Sources (RES) issues. Funding of energy inspections and issue of Energy Performance Certificates for buildings that join the programme, including the installation of systems for measuring, monitoring, recording, processing and viewing - on site and online - the operating data and results of the building energy management systems (BEMS), as well as control and operational management systems for electromechanical installations, are also eligible.

	Budget and funding	Total financing: EUR 10 million Source: NSRF - OPESD Application submission period: 26.03.2012- 25.06.2012 A total of 5 actions qualified for funding with a total budget of EUR 2,115,679.49
	Implementation body	CRES
	Supervisory Authority	Ministry of Environment, Energy and Climate Change

Title		Energy managers in public sector and general government buildings
Code of measure		**ΔΚ8**
Description	**Category**	Institutional-regulatory Implementation schedule
		Start: 2014
	Purpose/brief description	Designation of an energy manager in central and general government buildings to improve energy efficiency
	End use	Final energy consumption of the buildings in the target group
	Target group	Buildings where central and general government departments are housed
	Regional application	All of Greece.
Information on implementation	**List and description of energy saving measures**	The institution of energy manager in central and general government was introduced by JMD Δ6/Β/14826 (Government Gazette, Series II, No 1122, 17-06-2008) 'Measures to improve energy efficiency and energy savings in the central and general government' which described the competences of energy managers and allocated responsibility for implementing the measure to specific competent public bodies. The energy manager may be responsible for one or several buildings of each body, in accordance with operational needs and the total staff capacity, usable area and volume of the body's buildings. The energy manager may be an engineer with a university degree in a subject related to their specialty, or with a technical education if there is no comparable university education, and is designated by the Secretary General of the competent Ministry or the Region or

		the management board of said body. The responsibilities of the energy manager include: (1) collecting data on the energy consumption of buildings, (2) keeping a mandatory file or database on the energy consumption of the building, (3)preparing an annual summary report on energy-saving tracking and monitoring in accordance with the procedures, requirements and guidelines for conducting energy inspections required by Joint Ministerial Decision Δ6/Β/οικ. 11038/1999 (Government Gazette, Series II, No 1526, 08-07-1999), (4) verifying the proper operation of central heating and cooling installations and conducting periodic maintenance of boilers-burners and air conditioning units, (5) monitoring maintenance or repair works to improve energy efficiency. Implementing directives are expected to be issued by YPEKA for the effective implementation of this measure.
	Budget and funding	
	Implementation body	The whole central and general government
	Supervisory Authority	The responsibility for coordinating the implementation of the measure lies with the Secretaries General of the Ministry of Internal Affairs and of the Ministry of Development. Monitoring of implementation in each building of the central and the general government is carried out by the Secretary General of each Ministry by which the body concerned is supervised or to which it reports, who must inform the Secretaries General of the Ministry of Interior and the Ministry of Development, in writing and at regular intervals.

PURCHASING BY PUBLIC BODIES (ARTICLE 6)

Article 8 of Law 3855/2010 requires the issue of a joint decision by the Ministers for Interior, for Development and Competitiveness and for the Environment, Energy and Climate Change adopting improvement measures and setting minimum energy efficiency requirements in central and general government procurement. Moreover, the methodology to minimise the life cycle cost of the supplied items or comparable methods should be used on a case-by-case basis to ensure cost effectiveness of these procedures.

The minimum energy efficiency requirements should be applied at least:

(a) with the purchase of new equipment that has efficient energy consumption in all modes, including in standby mode;

(b) with the replacement or upgrading of existing equipment, as laid down in point (a);

This decision provides for the conditions and the procedure for the replacement or upgrading of non-energy efficient operating equipment and the preventive maintenance of existing electromechanical equipment.

Respective supplies of equipment that are not consistent with the specifications and the standards laid down in the aforementioned decision shall not be eligible as public expenditure, shall not be agreed and no payment orders are issued for them by the competent Financial Control Services.

Measures for decreasing the energy consumption of governmental buildings and buildings of the general public sector, as well as of the electric lighting systems used in public spaces must be taken by a joint decision of the Ministers for Interior, for Development and Competitiveness and for Environment, Energy and Climate Change. In particular, the decision should provide for the energy efficiency requirements applicable to the purchase, lease or erection of buildings or parts thereof, the compulsory use of natural gas, where a natural gas network is available, the compulsory gradual installation of central solar heating systems or other renewable energy sources' technologies and the installation of energy management systems, as well as the use of energy efficient lighting systems. Moreover, the energy efficiency requirements applicable to the electric lighting systems used in public spaces, which are be met by using energy efficient systems for remote management of the lighting, should be specified.

Procurement rules for vehicles of all categories used by the central and general government, should be established by a joint decision of the Ministers for Interior, for Development and Competitiveness and for Environment, Energy and Climate Change.

A list of specifications for energy efficient vehicles must be drawn up, by means of a joint decision of the Ministers for Environment, Energy and Climate Change and for Infrastructure, Transport and Networks, using, where applicable, minimised life-cycle cost analysis or comparable methods to ensure cost-effectiveness.

The following should also be established:

(a) the quota of clean vehicles, such as those powered with electricity, natural gas, biofuel, hydrogen or hybrid, in the public services and organisations;

(b) the procedure for replacing the old medium-weight and heavy public service vehicles used by the state and the general public sector, which weight more than 3.5 tons and are more than ten years' old, or for converting their engines to natural gas engines;

(c) the vehicle procurement procedure using the fuel savings label as a selection criterion;

(d) the terms and the criteria for implementing training programmes to promote the principles of economic, ecological and safe driving to the drivers of vehicles used by the organisations of the state and the general public sector.

Moreover, Article 18 of Law 3855/2010 designates the Ministry of Environment, Energy and Climate Change (YPEKA) as the proceeding ministry for national policy and drafting the National Action Plan for the Promotion of Green Public Procurement, as laid down by Community legislation. Its competences include cooperation between the co-competent ministries and central and general government agencies to promote the necessary legislation and take the necessary measures needed to implement the relevant provisions on Green Public Procurement.

The same article provided for the creation of an Interministerial Committee to see to the implementation of the above obligations. This eleven-member and non-paid committee shall have, inter alia, the following responsibilities:

(a) to draw up an Action Plan for the promotion of Green Public Contracts and to submit proposals for drawing national policy, within eighteen (18) months from assumption of duties. The National Action Plan will be approved by the Cabinet;

(b) to provide timely information to suppliers to the state and the general public sector, as well as other interested parties;

(c) to examine the setting of environmental criteria or to adopt the criteria issued by the European Commission;

(d) to select products, services and projects on which environmental criteria will apply;

(e) to evaluate, monitor the implementation of, and update the national policy and the Action Plan in our country;

(f) to propose to the Minister for Environment, Energy and Climate Change and any other competent Minister any necessary legislative arrangement and amendment to the current legislative framework, wherever required, as well as the adoption of measures necessary for the application of the relevant provisions on Green Public Contracts and the attainment of their purpose;

(g) to propose to the Minister for Environment, Energy and Climate Change and any other competent Minister to invite specialised scientists and experts engaging in research related to the Committee's objective, for them to provide technical and scientific support to the Committee;

(h) to propose to the Minister for Environment, Energy and Climate Change and any other competent Minister the assignment of studies and programmes for the promotion of the implementation of the Green Public Contracts and the Committee's work, to organise or participate in seminars, programmes, lectures or public discussions for providing information, developing and diffusing the principles and applications of the Green Public Contracts.

The Interministerial Commission on Green Public Procurement was established on 3 February 2012 by decision of the Minister for Environment, Energy and Climate Change.

Finally, Article 7 of Ministerial Decision Δ6/Β/14826/17.6.2008 'Measures to improve energy efficiency and energy savings in the central and general government' stipulates that energy labelling and certified energy efficiency indication of appliances supplied by the State is mandatory.

ENERGY EFFICIENCY MEASURES IN INDUSTRY

KEY POLICY MEASURES TO ADDRESS THE ISSUE OF ENERGY EFFICIENCY IN INDUSTRY

Table 21 summarises the measures aimed at improving energy efficiency in industry.

Table 21: *Policy measures for improving energy efficiency in industry.*

No	Title of measure	Final use targeted	Start
B1	Relocation of enterprises to industrial-business zones and business parks	Total energy consumption	Since 2013
B2	Innovative Entrepreneurship, Supply Chain, Food, Beverages	Total energy consumption	Since 2011
B3	Green Enterprise	Total energy consumption	Since 2010
B4	Support for improving energy efficiency in manufacturing enterprises	Total energy consumption	Since 2015

Title		Relocation of enterprises to industrial-business zones and business parks
Code of measure		**B1**
Description	**Category**	Financial incentives
	Implementation schedule	Start: 2013
	Purpose/brief description	The purpose of the programme **'Relocation of enterprises to industrial-business zones and business parks'** is to improve competitiveness through economies of scale for the enterprises to be relocated, so that they can operate in organised premises, and to eliminate the nuisance caused and the problems faced by manufacturing firms located within the urban fabric or other inappropriate areas or in areas which they should leave. The objectives of the programme include managing environmental resources and natural beauty in a sustainable way, fostering extroversion in business activity, strengthening entrepreneurship and support structures and streamlining enterprises' receiving infrastructure, reducing the intensity of energy use in organisations with high operational costs and creating conditions for strengthening business activity and employment. Existing manufacturing enterprises which started operating before 1 January 2009 can join the programme. For this programme, existing manufacturing enterprises are defined as having completed at least three years of operation. Moreover, they should have a turnover of more than EUR 30 000.00 in the last fiscal year 2012 (FY 2011) or more than EUR 100 000.00 cumulatively over the last three fiscal years.

	End use	Total energy consumption
	Target group	Existing manufacturing enterprises
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	The following are eligible to be financed under the programme: energy saving interventions (installing building envelope insulation, heat insulated window frames, energy class A air-conditioning units, energy saving light bulbs, high-efficiency burners and boilers, exhaust heat recovery, etc.). The procurement costs of equipment for energy self-production from RES and substitution of fuels with natural gas or LPG, are also eligible. More specifically, financing is provided for the following: ➢ high-efficiency burners and boilers; ➢ equipment to substitute oil with natural gas or LPG; ➢ equipment for exhaust heat recovery from boilers, air discharged from ventilation units, cooler condensers, etc.; ➢ equipment to substitute electricity or other conventional fuels with natural gas or LPG; ➢ equipment to install heat and power cogeneration systems; ➢ equipment to install systems for electricity generation from RES; ➢ equipment to install combined heating and cooling systems that use solar energy and biomass for own consumption purposes; ➢ equipment to install biomass combustion system for heating purposes; ➢ equipment for energy management systems (BEMS)
	Budget and funding	Programme budget: EUR 10 000 000.00 The programme provides support to projects with an investment cost from EUR 30 000.00 to EUR 400 000.00.

		The percentage of public funding for all costs amounts to 50% over the entirety of Greece. Application submission period: 15/4/2013-31/5/2013
	Implementation body	Enterprise and Business Park Licensing Directorate of the Secretariat General of Industry of the Ministry of Development and Competitiveness, Intermediate Body of the Operational Programme 'Competitiveness and Entrepreneurship' (OPCE)
	Supervisory Authority	Ministry of Development and Competitiveness

Title		Innovative Entrepreneurship, Supply Chain, Food, Beverages
Code of measure		**B2**
Description	**Category**	Business loans with favourable terms
	Implementation schedule	Start: 2011
	Purpose/brief description	The programme **'Innovative Entrepreneurship, Supply Chain, Food, Beverages'** involves enhancing investments that promote innovation and/or improve the competitiveness of products and service enterprises which have a comparative advantage, innovative investments by technologically advanced enterprises active in the primary and secondary sector, investments by secondary processing food industries, in particular those active in organic products or products with a designation of origin or local products, and business plans of the supply chain sector. Eligible to join the programme are very small-, small- and medium-sized enterprises pursuant to Commission Recommendation 2003/361/EC, or Annex I to Regulation EC No 800/2008 (L 214/3/09.08.2008), legitimately operating in Greece, apart from the special cases listed in ANNEX I. Borrowing terms: ➢ Amount of loan: from EUR 50 000.00 to EUR 500 000.00 ➢ Duration of loan: 5-10 years with a possibility of an interest-bearing grace period up to 2 years ➢ Annual interest rate: stable during the entire period of loan and equal to 4.53% ➢ Charge by Law 128/75: 0.60% Management costs: EUR 150.00

	End use	Total energy consumption
	Target group	Primary and secondary sector
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	The programme **'Innovative Entrepreneurship, Supply Chain, Food, Beverages'** provides financing for the purchase and installation of new modern machinery and other equipment and facilities, especially environment-friendly ones, which have reduced their energy consumption and have been equipped with modern process-automation and quality control technologies.
	Budget and funding	The Action is funded by the European Union and, in particular, by the European Regional Development Fund (ERDF) and the Greek State. The capital of the Loan Fund amounts to EUR 150 000 000.00. ETEAN SA, as the administrator of the Entrepreneurship Fund will pay a total of EUR 50000 000.00 and the bank established following a public tender for the joint administration of revolving loans will pay EUR 100 000 000.00 Start date of applications: 30 December 2011
	Implementation body	ETEAN SA and the Bank
	Supervisory Authority	Ministry of Development and Competitiveness

Title		Green Enterprise
Code of measure		**B3**
Description	**Category**	Financial incentives
	Implementation schedule	Start: 2010
	Purpose/brief description	The programme **'Green Business'** aims to create the conditions for integrating environmental concerns into business operation in order to make interventions in production chain processes. In particular, the programme's specific objectives are to reduce the energy footprint and particularly the environmental footprint of manufacturing enterprises, to develop and market 'green' products and services, to improve the environmental and social profile of businesses and to reduce the lack of social acceptance for manufacturing activity. Existing enterprises active in the Greek manufacturing and ancillary services market are eligible to join the programme.
	End use	Total energy consumption
	Target group	Existing manufacturing and ancillary services enterprises
	Regional application	All of Greece
Information on implementation	**List and description of**	Eligible to be funded under the programme '**Green Business**' are energy and water saving recovery interventions. The following are examples of this:

	energy saving measures	➢ Developing and implementing systems for the recovery/saving and/or substitution of conventional energy and water in the production process ➢ Bioclimatic and small-scale building interventions to save energy/heat/water ➢ Installing small-scare RES systems for own consumption
	Budget and funding	Programme budget: EUR 30 000 000.00 The programme provides support to projects with an investment cost from EUR 30 000.00 to EUR 200 000.00. The proportion of public funding is determined by where the investment is made. Application submission period: 25/05/2010-18/06/2010
	Implementation body	Enterprise and Business Park Licensing Directorate of the Ministry of Development and Competitiveness, Intermediate Body of the Operational Programme 'Competitiveness and Entrepreneurship' (OPCE)
	Supervisory Authority	Ministry of Development and Competitiveness

Title	Support for improving energy efficiency in manufacturing enterprises	
Code of measure		**B4**
Description	**Category**	Financial incentives
	Implementation schedule	Start: 2015
	Purpose/brief description	The measure entitled **'Support for improving energy efficiency in manufacturing enterprises'** aims to improve the energy efficiency of manufacturing enterprises, to reduce energy costs to boost their competitiveness, and also to reduce the impact of climate change resulting from the excessive use of energy. The types of aid include either a capital grant to implement energy saving interventions, or an interest subsidy on loans, or guarantees to obtain bank financing, or a combination of both. Particular emphasis will be placed on supporting SMEs.
	End use	Total energy consumption
	Target group	Existing manufacturing enterprises
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	The measure may finance the following activities: ➢ Conducting energy audits and benchmarking ➢ Streamlining of equipment, upgrade of facilities and installation of new energy efficient technologies

		➢ Education and training of staff ➢ Implementation of market control standards and mechanisms ➢ Certification, materials quality control, rules and procedures, calibration of laboratories ➢ Certification of experts and development of energy auditors registers ➢ Development, standardisation, design, demonstration, testing and promotion of new equipment and new materials ➢ Education-training of the civil servants who will be handling market control, standardisation issues, etc. ➢ Support to Energy Service Companies in implementing energy saving interventions Particular emphasis will be placed on ex-post evaluation and assessment of the results of any action financed, as well as on the competitive standing and energy saving performance of the contractor, and on the periodic ex-post evaluation of the overall measure and formulation of proposals for improvement.
	Budget and funding	Budget of measure: EUR 20 000 000.00
	Implementation body	the Secretariat General for Energy and Mineral Raw Materials of the Ministry of Environment, Energy and Climate Change in cooperation with the Secretariat General for Industry of the Ministry of Development and Competitiveness
	Supervisory Authority	Ministry of Environment, Energy and Climate Change - Ministry of Development and Competitiveness

ENERGY EFFICIENCY MEASURES IN THE TRANSPORT SECTOR

KEY POLICY MEASURES TO ADDRESS THE ISSUE OF ENERGY EFFICIENCY IN THE TRANSPORT SECTOR

Table 22 lists the policy measures implemented to improve energy efficiency in passenger and freight transport and to move towards more sustainable modes of transport.

Table 22: Policy measures to improve energy efficiency in the transport sector.

No	Title of measure	Final use targeted	Start
M1	Reshaping of the public transport system	Energy consumption in passenger transport	2008
M2	Transport infrastructure projects	Total energy consumption of the sector	2006
M3	Development of urban mobility plans	Total energy consumption in road transport	Since 2011
M4	Promotion of economical, safe and eco-driving.	Total energy consumption of the sector	2008
M5	Incentives for the replacement of private vehicles and to promote the use of energy-efficient vehicles (vehicles fuelled by natural gas and biofuels and hybrid vehicles)	Energy consumption in passenger transport	2009
M6	Eco-labelling – Energy label for cars	Energy consumption in road transport	2009
M7	Compulsory quotas of vehicles with greater energy efficiency in the fleets of the public services and of public bodies	Energy consumption in road transport	2012
M8	Linking of vehicle taxation to energy efficiency and $CO_{2\ emissions}$	Energy consumption in road transport	2010
M9	Replacing old public and private light trucks	Energy consumption in road transport	2010

No	Title of measure	Final use targeted	Start
M10	Replacing old private passenger vehicles	Energy consumption in road transport	2010
M11	Promotion of CNG and LPG-powered passenger vehicles	Energy consumption in road transport	2011
M12	Introduction of electric vehicles and electric vehicle recharging points	Energy consumption in road transport	2014

Title		Reshaping of the public transport system
Code of measure		**M1**
Description	**Category**	Energy efficiency improvement mechanism
	Implementation timeframe	Start: 2008
	Purpose / brief description	This measure aims to increase the percentage of citizens using public transport. Facilitation of the task of public transport with the objective of increasing the share of passenger demand for fixed rail and road public transport. The objective is to increase the percentage of public transport use from 26.6% in 2008[1] to 35% in 2016. Determining energy saving requires a documented system to be applied to collect and process information so that the implementation of this measure can be monitored and evaluated.
	End use	Energy consumption in passenger transport
	Target group	• Experts specialising in transport subjects. • Central administration • Local government • Transport project management bodies • The general public (as the recipient of the result)
	Regional application	All of Greece

[1] EUROSTAT: Panorama or Transport 2007, table 5.25 DGTREN, page 106

Information on implementation	**List and description of energy saving measures**	Many of the actions of the measure have been completed in the capital region and include: • Improvement of public transport route planning. • Linking of new routes to existing ones. • Creation of organised parking spaces near to bus stops and metro stations. • Information systems for the travelling public. The following actions are in the planning stage for all the urban centres in the country that are subject to an organisational framework of operation for the public transport system. • Improving the reliability of public transport by the use of smart control and management systems on transport networks. • Facilitating the connection and functionality of existing transport networks (i.e. between different means of transport and different geographical areas). • Smart ticket charging and cancelling systems. • Monitoring the quality of service provided by public transport with the aim of increasing their share in passenger transport. Moreover, the 'ENERGY EFFICIENCY'' (ΕΞΟΙΚΟΝΟΜΩ) Programme (Measure DM3), Axis 3, Action 3.3, enables local authorities that have demonstrated their need to reform the public transport system to include transport studies as an eligible action. This programme is in the stage of evaluating the municipalities that are candidates to receive funding.
	Budget and funding	
	Implementation body	Transport project management bodies

	Supervisory Authority	Ministry of Environment, Energy and Climate Change, Ministry of Infrastructure and Transport, Local Authorities

Title	Transport infrastructure projects	
Code of measure		**M2**
Description	**Category of measure**	Energy efficiency improvement mechanisms
	Implementation timeframe	Start: 2006
	Purpose / brief description	The objective is to shorten travel time for cars and public transport and thereby to improve transport quality and safety and achieve energy savings. Additionally, the construction of appropriate infrastructure will increase the viability of alternatives (walking, cycling, etc.). Increased use of fixed rail transport will help to reduce private car use and bring energy savings.
	End use category	Total energy consumption of the sector
	Target group	• Central government • Local government • The general public
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	Through the development programme 'Third Community Support Framework' 2000-2008, a series of infrastructure projects have been completed and delivered, contributing to the intermediate energy savings target for 2010. These include: • Extension of the Athens Metro • Extension of the suburban railway in the wider Athens region • New national and regional trunk routes.

		Moreover, the following actions have been implemented at the initiative of Municipalities across the country: • Creation of low traffic circulation streets • Creation of pavements and cycling paths • Street lighting using RES Actions that are underway and whose implementation will be completed by 2016 include: • Creation of new infrastructure (road improvements, new bus lanes, installation of smart traffic lights for public transport, modernisation and extension of the rail network, etc.) • New metro in Thessaloniki • Installation of RES in urban and municipal transport remote service points (stops, ticket vendors, stationmasters etc.) for energy saving purposes
	Budget and funding	NSRF: Operational Programme 'Improvement of Accessibility', Operational Programme 'Environment and Sustainable Development'
	Implementation body	SMS of Operational Programme 'Reinforcement of Accessibility' SMS OPESD
	Supervisory Authority	Ministry of Environment, Energy and Climate Change, Ministry of Infrastructure, Transport and Communications, Local Authorities

Title		Development of urban mobility plans
Code of measure		**M3**
Description	**Category of measure**	Regulatory Voluntary agreements and joint ventures
	Implementation timeframe	Start: 2011
	Purpose / brief description	Improvement of mobility and of travel safety, curtailing of individual travel by private car, energy savings.
	End use category	Total energy consumption in road transport
	Target group	• Central administration • Local government • Hospitals, schools and public services • Companies • Financial leasing services • Owners of car parks • The general public.
	Regional application	Urban centres throughout Greece
Information on implementation	**List and description of energy saving measures**	Implementation in the large municipalities of Athens and Thessaloniki and in other urban centres. Actions: • Optimisation of private car use (car-sharing). Car-sharing has been implemented successfully in other European cities (Barcelona, Bremen, etc.) and is used by bodies or in company schemes which have a lot of vehicles for the travel of members / customers between specific pick-up points and parking areas.

		The body or company pays the costs of purchase, operational management and maintenance of the fleet and the customer / member is charged in accordance with usage time and the distance covered. In Greece, and specifically in Athens, car-sharing has been run on a pilot basis by CRES in cooperation with a private rent a car company since the beginning of 2011. • Promotion of travel by foot and bicycle. (Karditsa, Trikala and Thessaloniki have networks of bike path) and it is planned to develop several tens of kilometres in Athens and other Greek cities and islands. In Athens, carrying bikes on trams and the electric railway has been permitted. • Development of mobility plans at large companies, schools, tourism sites, hospitals and event venues, etc. The development of mobility plans involves actions which promote the avoidance of individual travel in separate cars by large numbers of people who have the same destination at a defined time; for example, free tickets for travel to and from the workplace by public transport, travel in buses of employers, access to park-and-ride and group car use. Gradual implementation, with pilot demonstration actions which will be an example for further development and other areas, is being provided for. Moreover, through the 'ENERGY EFFICIENCY'' (ΕΞΟΙΚΟΝΟΜΩ) Programme (Measure DM3), Axis 3, Action 3.3 urban mobility studies are eligible interventions.
	Budget and funding	Proposed budget: EUR 100 000 000.00 annually.
	Implementation body	-
	Supervisory Authority	Ministry of Environment, Energy and Climate Change, Ministry of Infrastructure, Transport and Communications, Local Authorities

Title		Promotion of economical, safe and eco-driving.
Code of measure		**M4**
Description	**Category**	Regulatory Updating Training and education
	Implementation timeframe	Start: 2008
	Purpose / brief description	Eco-driving is a new way of driving which combines simple driving techniques with rules of maintenance. This leads to a fuel saving of 5-20%, cuts pollutant emissions, causes less noise pollution and reduces the number of accidents.
	End use	Total energy consumption of the sector
	Target group	• Driving instructors • Professional drivers • Private vehicle drivers • Vehicle fleet operators
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	CRES, as a promoter of the measure, has implemented the following actions: 1. Information campaign - Creation of the website for the National Campaign www.ecodriving.gr - Publication of printed and electronic information and educational material - Organisation and participation in numerous events to promote economical/ecological driving - Development of computational and educational tools 2. Training of professional drivers

		Pilot training activities have been implemented for all types of vehicles for transport operators in the public, wider public and private sectors. Moreover, Article 8(3)(d) of Law 3855/2010 'Measures to improve energy efficiency in end use, energy services and other provisions' stipulates the implementation of training courses to promote economical eco-driving to vehicle drivers in the public and the wider public sector. 3. Incorporation of eco-driving in the training for the driving licence. Since 2009, the main principles of economical-ecological driving have been incorporated in the new theoretical training textbooks for learner drivers. The ultimate goal is to standardise the certification process for driving instructors and to comprehensively integrate economical-ecological driving in the theoretical and practical training of learner drivers and in the retraining process for professional drivers. 4. Education of private vehicle drivers through seminars. It is to be applied on a large scale after the Incorporation of eco-driving in the educational process for obtaining a driving license has been completed. The implementation of training courses to promote economical-ecological driving to vehicle drivers at the municipal level is also stipulated in Axis 5 of the 'ENERGY EFFICIENCY' (ΕΞΟΙΚΟΝΟΜΩ) programme.
	Implementation body	Ministry of Transport, Infrastructure and Networks, CRES, Driving Schools
	Supervisory Authority	Ministry of Infrastructure, Transport and Networks

Title		Incentives for the replacement of private vehicles and to promote the use of energy-efficient vehicles (vehicles fuelled by biofuels and hybrid vehicles)
Code of measure		**M5**
Description	**Category**	Financial incentives Legislation
	Implementation timeframe	Start: 2009 End: 2012
	Purpose / brief description	The purpose of the measure was to provide financial and tax incentives to replace old energy-intensive vehicles with new, state-of-the-art ones and to promote energy efficient vehicles.
	End use	Energy consumption in passenger transport
	Target group	• Central government • Policymakers • Owners of private vehicles • Taxis • Light vehicles (LDV) < 3.5 tonnes. • Vehicles registered by 31.12.1998
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	Decree-Law 16.9.2009/2 'Measures to address air pollution' provides for the following economic incentives: • Tax incentives for alternative technology vehicles (natural gas vehicles, hybrid vehicles), and vehicles or improved engine specifications (EuroVI) (Article (2)(1)(A). Circulation taxes were adjusted and are now calculated based on the engine capacity and the environmental pollution caused by the engine of vehicles.

		• Financial incentives for scrapping of private cars [Article 3(1), Table 4) A subsidy is provided for vehicle scrapping. The amount of subsidy depends on the engine capacity of the vehicle withdrawn. Additional funding is provided for the purchase of new vehicles with EURO 4 and EURO 5 engines. The implementation of this legislative act stopped on 3 November 2009 with 140,000 vehicles having been scrapped. The measure of private car scrapping was resumed by means of Ministerial Decision ΔΕΦΚ 5006718ΕΞ2001/11.02.2011 'Incentives to replace old technology cars' (Government Gazette, Series II, No 246, 11-02-2011). New private passenger cars with an engine capacity of up to 2,000 cc that meet the requirements of Directive 1998/69/EC 'Phase B' or later, or Regulation, and are intended to replace private passenger cars withdrawn from circulation to be scrapped, are exempt from the registration fee at a rate that depends on the engine capacity and the taxable value of the new car, as defined in Article 8(2)(a) of Law 3899/2010 'Urgent measures for the implementation of the assistance programme of the Greek economy' (Government Gazette, Series I, No 212, 17-12-2010).
	Budget and funding	National Resources
	Implementation body	Ministry of Infrastructure, Transport and Networks
	Supervisory Authority	Ministry of Infrastructure, Transport and Networks, Ministry of Finance, Ministry of Environment, Energy and Climate Change

Title		Eco-labelling – Energy label for cars
Code of measure		**M6**
Description	Category	Legislation Updating and obligatory provision of information
	Implementation timeframe	Start: 2012
	Purpose / brief description	The target of the measure is for the majority of vehicles to have improved energy efficiency and lower emissions.
	End use	Energy consumption in road transport
	Target group	• Car dealers • Vehicle sellers • The general public.
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The measure is applied in Greece under Ministerial Decision No 90364/31.01.2002 'Programme for raising awareness and providing information to consumers on fuel economy and CO_2 emissions in respect of the marketing of new passenger cars' (Government Gazette, Series II, No 110, 31-01-2002) (transposing Directive 1999/94/EC). The measure has not had the anticipated results because the responsible vehicle sellers have not publicised it appropriately at car shows. However, many companies highlight the label with the minimum requirements of the Directive. For this reason, it is necessary to take the following measures for immediate implementation of the measure: Road transport - mainly passenger cars:

		Raising the awareness of the public on their contribution to the problems of climate change and environmental pollution. More specifically, actions to provide the public with systematic information with the objective of ensuring the majority of vehicles have lower fuel consumption and lower emissions.
	Budget and funding	National Resources
	Implementation body	Ministry of Infrastructure, Transport and Networks
	Supervisory Authority	Ministry of Finance, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change

Title		Compulsory quotas of vehicles with greater energy efficiency in the fleets of the public services and of public bodies
Code of measure		**M7**
Description	Category	Legislation Exemplary role of the public sector
	Implementation timeframe	Start: 2012
	Purpose / brief description	The target of the measure is for the majority of vehicles to have improved energy efficiency and lower emissions.
	End use	Energy consumption in road transport
	Target group	• Policy makers • Public Services and Organisations
	Regional application	Public sector
Information on implementation	List and description of energy saving measures	600 new natural gas public transport buses were procured under the 3rd Community Support Framework 2000-2006. Article 8(3)(a) and (b) of Law 3855/2010 requires: • a quota of clean vehicles; • a procedure to replace old medium and heavy vehicles; • setting energy efficiency as a selection criterion in the procurement process of public services and organisations. Moreover, through the 'ENERGY EFFICIENCY'' (ΕΞΟΙΚΟΝΟΜΩ) Programme (Measure DM3), Axis 3, Action 3.1, it is possible to convert heavy vehicles using high biodiesel blends,

		to install Diesel Particle Filters (DPF) in municipal fleet vehicles constructed after 1995, to convert petrol-driven vehicles of municipal fleet into LPG vehicles and to convert petrol-driven vehicles of municipal fleet into bi-fuel natural gas vehicles.
	Implementation body	Ministry of Infrastructure, Transport and Networks
	Supervisory Authority	Ministry of Finance, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change

Title		Linking of vehicle taxation to energy efficiency and $CO_{2\ emissions}$
Code of measure		**M8**
Description	Category	Legislation
	Implementation timeframe	Start: 2010
	Purpose / brief description	The purpose of the measure is to promote vehicles with lower fuel consumption and lower emissions.
	End use	Energy consumption in road transport
	Target group	Vehicles owners
	Regional application	All of Greece.
Information on implementation	List and description of energy saving measures	Circulation tax is henceforth directly linked with each vehicle's pollutants, namely carbon dioxide emissions. The amount of the tax is calculated by multiplying CO2 g/km of the vehicle by the amount applicable to each scale. From 0 to 100 CO_2 g/km 0 From 101 to 120 CO_2 g/km 0.80 From 121 to 140 CO_2 g/km 1.00 From 141 to 160 CO_2 g/km 1.50 From 161 to 180 CO_2 g/km 2.00 From 181 to 200 CO_2 g/km 2.25 From 201 to 250 CO_2 g/km 2.50 Above 251 CO_2 g/km 3.00
	Implementation body	Ministry of Finance

Title		Replacing old public and private light trucks
Code of measure		**M9**
Description	Category	Legislation
	Implementation timeframe	Start: 2010
	Purpose / brief description	Replacing old public and private light trucks which meet EURO III standards with new vehicles which meet EURO V standards.
	End use	Energy consumption in road transport
	Target group	The whole public and private sector
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The purpose of the measure is to replace old public and private light trucks meeting EURO III standards with new vehicles meeting EURO V standards. Private new technology light trucks (up to 2 000 cc), bought in place of old ones, will be partially or wholly exempted from the specific registration fee.
	Implementation body	Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, the Ministry of Administrative Reform and e-Governance, public bodies and the private sector.

Title		Replacing old private passenger vehicles
Code of measure		**M10**
Description	Category	Legislation
	Implementation timeframe	Start: 2010
	Purpose / brief description	Replacing old private passenger vehicles which meet EURO III standards with new vehicles which meet EURO V standards.
	End use	Energy consumption in road transport
	Target group	Private sector (private vehicle owners)
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The measure aims at replacing public and private old passenger vehicles which meet EURO III standards with new vehicles which meet EURO V standards. Under the measure, private new technology passenger vehicles (up to 2000 cc) bought in place of old ones, will be partially or wholly exempted from the specific registration fee. Old vehicles are sent for scrapping (retired) under the approved system for alternative management of End-of-Life Vehicles (ELVs).
	Implementation body	Ministry of Finance, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles

Title		Promotion of CNG and LPG-powered passenger vehicles
Code of measure		**M11**
Description	Category	Legislation
	Implementation timeframe	Start: 2011
	Purpose / brief description	Promotion of CNG and LPG-powered private passenger vehicles
	End use	Energy consumption in road transport
	Target group	The whole public and private sector
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	This measure involves the provision of incentives to facilitate the market penetration of private passenger vehicles fuelled by compressed natural gas (CNG) or liquefied petroleum gas (LPG).
	Implementation body	Ministry of Finance, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles

Title		Introduction of electric vehicles and electric vehicle recharging points
Code of measure		**M12**
Description	Category	Legislation
	Implementation timeframe	Start: 2014
	Purpose / brief description	Promotion of the purchase and use of electric vehicles (passenger cars , motorcycles, bicycles, heavy vehicles) and construction of vehicle recharging points (RES-powered and/or conventional)
	End use	Energy consumption in road transport
	Target group	The whole public and private sector
	Regional application	All of Greece
Information on implementation	List and description of energy saving measures	The measure involves the provision of favourable tax incentives and subsidies for the purchase of electric vehicles of any type for private motorists and public agencies operating vehicle fleets. In addition to the purchase of vehicles, this measure will include a subsidy for the construction of public and private vehicle recharging points, powered mainly by renewable energy sources and/or conventional energy sources.
	Implementation body	Ministry of Finance, Ministry of Infrastructure, Transport and Networks, Ministry of Environment, Energy and Climate Change, and owners of private and public vehicles

PROMOTION OF EFFICIENCY IN HEATING AND COOLING (ARTICLE 14)

COMPREHENSIVE ASSESSMENT

To monitor the implementation of Article 14 of Directive 2012/27/EU, the Ministry of Environment, Energy and Climate Change (YPEKA) established a Monitoring Committee coordinated by the Directorate for Renewable Energy Sources and Electricity and the Directorate for Energy Policies and Energy Efficiency. The members of the group are CRES and the working group established for the harmonisation of national law with Directive 2012/27/EU (online publication No: ΒΛ170-4Μ5).

The exceptions relating to Article 14(6) of Directive 2012/12/EU were submitted promptly to the European Commission. The transposition of the Directive into Greek law is currently in progress, so the processes for the comprehensive assessment have not started yet.

The institutional framework for the promotion of efficient heating and cooling by using the potential of high efficiency cogeneration and efficient district heating and cooling systems is in place. Directive 2004/08/EC is transposed into the Greek law with Law 3734/2009 ‘Promotion of cogeneration of two or more useful energy forms, regulation of issues related to the Mesochora Hydroelectric Project and other provisions (Government Gazette, Series I, No 8, 28-01-2009).

Ministerial Decision Δ5-ΗΛ/Γ/Φ1/οικ.15606 & 15641/15.07.2009 (Government Gazette, Series II, No 1420, 15-07-2009) set the aligned reference efficiency levels for the non-combined generation of heat and power, as well as the details of the method for calculating power from cogeneration and efficiency of cogeneration.

Law 3851/2010 ‘Accelerating the development of Renewable Energy Sources to address climate change and other provisions relating to issues with the competence of the Ministry of Environment, Energy and Climate Change’ streamlined the approval process concerning licences for production, installation and operation of cogeneration systems.

Furthermore, financial incentives are given by means of a subsidy for electricity produced by high-efficiency cogeneration of heat and power plants. The subsidy is financed through the Special Duty for RES, the NSRF and investment law 3908/2011 (Government Gazette, Series I, No 8, 01-02-2011).

The application of Ministerial Decision Δ6/Φ1/οικ.8786/14.05.2010 ‘Implementation of the System of Guarantee of the Origin of Electricity from RES and high-efficiency cogeneration of heat and power systems and its Safeguard Mechanism’ (Government Gazette, Series II, No 646, 14-05-2010) will contribute to the development of district heating networks, as only cogeneration plants which are demonstrated to be of high-efficiency have the right to issue a Certificate.

Government Gazette Issue I, No 889, 22-03-2012, amended and supplemented Decision Δ5-ΗΛ/Γ/Φ1/οικ.15641 (Government Gazette, Series II, No 1420, 15-07-2009) of the Minister for Development 'Determining the details of the method for calculating power from cogeneration and efficiency of cogeneration and regulating issues related to the licensing of CHP and high-efficiency CHP installations and their participation in the electricity market and the Feed-In Tariffs for RES and CHP, and compensation thereof.'

Table 23 shows the programmes that aim to promote efficient heating and cooling systems.

Table 23: Policy Measures to promote efficient heating and cooling systems.

No	Title of measure	Final use targeted	Start
ΘΕΡΜ1	Installation of high-efficiency cogeneration of heat and power (CHP) systems with natural gas in hospitals	Promotion of efficient heating and cooling systems	2011
ΘΕΡΜ2	Installation of CHP systems	Promotion of efficient heating and cooling systems	2009

Title		**Installation of high-efficiency cogeneration of heat and power (CHP) systems with natural gas in hospitals**
Code of measure		**ΘEPM1**
Description	**Category**	Subsidy
	Implementation schedule	Start: 2011
	Purpose/brief description	Installation of high-efficiency CHP systems using natural gas in hospitals to improve energy efficiency
	End use	Energy consumption for heating, domestic hot water, electricity
	Target group	Public hospitals
	Regional application	All of Greece
Information on implementation	**List and description of energy saving measures**	High-efficiency cogeneration of heat and power (CHP) projects and cooling systems using natural gas in public hospitals will be financed through the programme **'Energy efficiency, cogeneration, energy management'**. The actions to be funded include: a) construction of a high efficiency cogeneration of heat and power facility b) construction of a facility for making use of the heat produced from the CHP and/or RES facility for cooling purposes c) works required for the safe operation of the system d) construction of systems to assist heating/cooling systems with RES e) necessary connections to existing generation-distribution systems

		f) necessary connections with utility networks g) system for recording and monitoring these facilities and equipment h) Technical-Energy Consultant services i) publicity actions
	Budget and funding	Total financing: EUR 15 000 000.00 Source: NSRF - OPESD
	Implementation body	Ministry of Health, Ministry of Defence, NHS and DEPANOM SA
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	By March 2014, a total of 5 applications have been included in the programme with a total budget of EUR 11.4 million. The total installed capacity of facilities included in the programme is 7.7 MW, and the programme's expected benefits include the creation of 84 new jobs and a reduction of greenhouse gas emissions of 24.7 kt CO_2. The average primary energy savings are 35.7%.

Title		**Installation of CHP systems**
Code of measure		**ΘΕΡΜ2**
Description	**Category**	Subsidy
	Implementation schedule	Start: 2009
	Purpose/brief description	For the construction of new district heating networks or the extension of existing ones, calls for the following programmes were launched: **'District heating networks'** and **'District heating network of Florina'**. The call for the submission of tenders for the programme **'District heating networks'** was addressed to public entities, 1st and 2nd grade local authorities, municipal water and sewage companies and municipal and inter-municipal district heating companies, and was funded under the OP-ESPD. The **'District heating network of Florina'** only concerned the water and sewerage company of the Municipality of Florina. The aim of both programmes is to promote sustainable regional development by exploiting local energy resources, to reduce air pollution and to reduce greenhouse gases that cause climate change.
	End use	Production, transport and distribution of thermal energy
	Target group	Legal persons operating and managing district heating networks
	Regional application	All of Greece and the Region of Western Macedonia
Information on implementation	**List and description of**	Both programmes may finance the following activities: ➢ Transmission pipelines - Distribution Network - Pump stations and accompanying facilities

	energy saving measures	➢ Supply and installation of pumping stations, boilers, heat exchangers and thermal substations ➢ PPC conversions ➢ Connections with utility networks ➢ Publicity ➢ Technical consultancy ➢ Archaeological and rescue operations ➢ Expropriations - Easements - Purchase of plots ➢ Running of pipelines through railway networks
	Budget and funding	Total funding of the programme: **'District heating networks'**: EUR 50 000 000.00 Total funding of the programme: **'District heating network of Florina'**: EUR 82 000 000.00 Source: NSRF - OPESD
	Implementation body	Legal persons operating and managing district heating networks, OP-ESD
	Supervisory Authority	Ministry of Environment, Energy and Climate Change
	Expected results	By March 2014, a total of three operations were included in the programme **'District heating networks'** with a budget of EUR 34.5 million and one operation was included in the programme **'District heating network of Florina'** with a budget of EUR 56.7 million. The total installed capacity of the systems for the programme **'District heating networks'** is 153.61 MW and for the programme **'District heating network of Florina'** the capacity is 70 MW. The programme **'District heating networks'** is expected to lead reduction in greenhouse gas emissions of between 19.3% and 97.3% and to the creation of 222 new jobs. The programme **'District heating network of Florina'** is expected to lead to a reduction of greenhouse gas emissions of 36.3 kt CO_2 (a 88% reduction) and to the creation of 761 new jobs.

INDIVIDUAL FACILITIES: COST-BENEFIT ANALYSIS AND RESULTS

The process and methodology of cost-benefit analysis at the level of facilities, including district heating companies and other stakeholders (Annex IX, Part 1 of the Directive), has not been determined yet.

INDIVIDUAL FACILITIES: CRITERIA FOR EXCEPTIONS FROM THE OBLIGATION TO PERFORM A COST-BENEFIT ANALYSIS OF THE UTILISATION OF WASTE HEAT

On 31 December 2013, the exceptions under Article 14(6) of Directive 2012/12/EU were notified to the European Commission. The exceptions were drawn up by the Directorate for Renewable Energy and Electricity and the Directorate for Energy Policies and Energy Efficiency of the Ministry of Environment, Energy and Climate Change (YPEKA), with the support of the Centre for Renewable Energy Sources (CRES) and the working group that was set up to harmonise national law with Directive 2012/27/EU (Online Publication No: ΒΛ170-4Μ5), based on data provided by the Secretariat General for Industry, the operators of existing district heating networks and PPC.

The criteria for exemptions from the obligation to carry out a cost-benefit analysis of the utilisation of waste heat pursuant to Article 14(5) and (6) of Directive 2012/12/EU involve either new or existing substantially refurbished installations, i.e. the cost of renovating the installation exceeds 50% of the investment cost for a new comparable installation.

Exceptions laid down in Article 14(6)

1. **Electricity generating installations**

   Peak load and back-up electricity generating installations planned to operate under 1500 operating hours per year as a rolling average over a period of five years, are exempted.

2. **Industrial installations with a total thermal input exceeding 20 MW mentioned in Article 14(5)(c) and (d), are also exempted.**

   As regards connection of industrial installations to an existing district heating/cooling network, installations where the ratio of annual waste heat in GWh to the distance in km from the network is less than 1.5 are exempted.

   As regards the use of waste heat to satisfy economically justified demand through cogeneration, the minimum thresholds for exempting have not so far been notified. However, these are expected to be decided by 31 December 2015 when the comprehensive assessment of the potential for the application of high-efficiency cogeneration required by Article 14(1), is expected to have been completed.

With regard to exemptions for industrial installations with a rated heat output exceeding 20 MW from the obligation to carry out a cost–benefit analysis of the utilisation of waste heat and connection to an existing district heating/cooling network, such installations that have waste heat at a useful temperature level and where the ratio of annual waste heat in GWh to the distance in km from an existing district heating/cooling network is less than 1.5, are exempt from the requirement for a cost-benefit analysis. A basic precondition is that the additional demand for heat from district heating networks be greater than or equal to the available waste heat from the industrial installations.

This is based on analysis of the financial viability of the potential investment in connecting industrial installations to existing district heating/cooling networks. For assessment of the economic viability of investment the internal rate of return (IRR) is used. The lifetime of the investment is set at 20 years, and the minimum desired internal rate of return on the investment is set at **12 %**, taking into account current economic conditions.

To establish the cash flow of the investment we have taken into account the costs as a function of the distance between the industrial installation and the existing district heating/cooling network and revenue from the sale of the available waste heat from the industrial installations to the district heating/cooling network.

Investment costs

The unit cost of installing the network for transmitting waste heat from the industrial installation to the district heating/cooling network is 230 €/metre, calculated on the basis of the corresponding cost of developing the existing district heating networks now in operation. This includes the cost of purchasing the pipelines and the cost of all the work needed to install them.

The investment cost of the other systems/works (e.g. engineering studies, supervision, pumping stations, contingencies, etc.) is estimated at 8 % of the total cost of installing the transmission network.

In accordance with the above, the investment cost is based on the following equation:

$$C_i = C_n + C_r \qquad (1)$$

where,

$C_n = x*10^3*230$

$C_r = 0.08\ C_n$

therefore

$$Ci = 1.08* x*10^3*230 \qquad (2)$$

Where,

C_i : Total cost of investment (in €)

C_n: Cost of the transmission network (€)

C_r : Cost of other systems/works (€)

x : Distance from the district heating network (in km)

Annual maintenance and operating costs

Taken as 1 % of the cost of investment:

$$C_{o\&m} = 0.01*C_i \qquad (3)$$

Annual revenue from the sale of heat

The selling price of the heat supplied is set at 70 % of the current minimum selling price of existing district heating networks. According to existing tariffs for the sale of heat to consumers by the public district heating networks, the minimum selling price is 43 euro/MWh. Therefore, the selling price of the heat is calculated at 30 euro/MWh.

The annual revenue from the sale of heat is:

$$I = 30 * Q_{th} \quad (4)$$

where,

I : Annual revenue (€)

Q_{th} : Annual waste heat (MWh)

Table 24 shows the aggregate cash flows of investment from the above analysis as a function of the distance (x) and the available waste heat (Q_{th}).

Table 24: Cash flows for the evaluation of the investment.

Cash flow	Equation
Cost of investment (€)	$C_i = 1.08 * x * 10^3 * 230$
Annual maint. & op. investment (€)	$C_{o\&p} = 0.01 * Ci$
Annual revenue (€)	$I = 30 * Q_{th}$

The analysis of the change in the IRR of the investment as a function of distance and waste heat showed that when the waste heat/distance ratio increases, the investment becomes more cost-effective. In each of the cases examined we have identified the minimum ratio that ensures a minimum internal rate of return (IRR = 12 %), which is the criterion for exemption (1.5 GWh/km).

The price resulting from this methodological approach may be recalculated during the preparation of the comprehensive assessment of the potential for efficient heating and cooling, when the data necessary for a more detailed analysis of the systems will be compiled and assessed.

ENERGY TRANSFORMATION, TRANSMISSION AND DISTRIBUTION AND RESPONSE TO REQUEST (ARTICLE 15)

CRITERIA OF ENERGY EFFICIENCY IN TARIFFS AND NETWORK REGULATIONS

The tariffs for use of the Greek Electricity Distribution Network (EDDIE) are fixed based on RAE Decision No 1017/2012 and ensure coverage of the operating costs of distribution activity (operation and maintenance), the repayment of invested capital and the payment of a reasonable return thereon, taking account of the cost of borrowing, the business risk and the cost of capital for corresponding activities. The profit from this activity comes from the return on invested capital and any improvement of the operational efficiency of the network (reduction of operating costs). The regulatory policy applied currently facilitates investment in networks in order to promote a cost-effective and efficient method of improving the quality of service, security of supply and consumer protection.

As for natural gas, based on current legislation and the regulatory framework governing the Greek natural gas market, the tariffs for the National Natural Gas System (ESFA) do not any incentives, which is to the detriment of overall energy efficiency.

On the contrary, the ESFA Management Code (RAE Decision No 526/2013, Government Gazette, Series II, No 3131, 09.12.2013), requires that DESFA submit annually to RAE a documented proposal on the Loss Coefficient for LNG (Liquefied Natural Gas) Installations. This factor operates as a target DESFA to ensure the installation's optimal energy efficiency. It also stipulates that DESFA must pay a fee to users if the outturn Loss Coefficient for an LNG installation exceeds that approved by RAE.

This provision gives DESFA the economic incentive to reduce losses as far as possible and thus to contribute to energy efficiency in the sense defined in Directive 2012/27/EU.

Furthermore, the Pricing Rules for ESFA's Key Activities (RAE Decision No 594/2012, Government Gazette, Series I, 2093, 05-07-2012) provide that the operation of the CHP plant in the LNG terminal at Revithoussa operates under a regulated regime. In particular, revenue from the injection of excess electricity to ESMIE (National Electricity Transmission System) reduces the operating costs of the facility, leading to a reduction of charges for the use of the LNG facility which is to the benefit of users of all ESFA. It can therefore be seen as an investment for the sole purpose of improving the energy efficiency of the facility.

FACILITATION AND PROMOTION OF RESPONSE TO REQUEST

The current regulatory framework does not hinder the Hellenic Electricity Distribution Network Operator (HEDNO) and suppliers from providing services as part of demand response, demand management and distributed generation measures.

Specifically with regard to distributed generation, the establishment of the Special Programme of photovoltaic systems on residential roofs or roofs of small businesses, resulting in energy generation in proximity to consumption, is a favourable adjustment towards energy efficiency (Annex XI 2). Moreover, the forthcoming regulations on offsetting the energy produced against the energy consumed (net metering) in autoproducer plants, is expected to stimulate consumer interest in auto-production, contributing to demand response.

Further, to enable the dynamic pricing from suppliers as part of responsiveness to demand (time-of-use tariffs, real-time pricing, etc.) the appropriate smart meter infrastructure is required. This, however, is already being programmed for implementation by HEDNO SA.

Until the installation of smart meters, peak demand can be managed by providing a multizone tariff (known as 'night-time tariff') adjusting the reduced pricing hours to normalise peak demand, as developed recently after connection of several photovoltaic plants to the medium and low voltage network, while informing the public about deferred consumption loads.

SAVINGS ARISING FROM ALL ENERGY SUPPLY MEASURES

The reduction of technical losses of the network, which relate primarily to iron and copper losses in transformers and Joule losses in distribution lines, is key to energy efficiency and, hence, to the efficient operation of distribution networks. Recently, HEDNO SA submitted to RAE a study on the losses in the distribution network of the interconnected system with reference to the years 2011 and 2012, which indicates that the losses in the Interconnected Grid account for 5.9% of the incoming energy, a rate corresponding to the average levels of EU countries. Since the levels of losses depend on how the Distribution Grid is developed and operates in conjunction with the evolution of the load and the equipment used, PPC SA, and now HEDNO SA were and still are enforcing and implementing significant investments every year (line payments, extensions and renovations to networks, additions to substations and creation of new ones, installation of capacitors on medium voltage lines, etc.) to develop the existing infrastructure and, thereby, to improve the operation of the Grid. Furthermore, PPC SA has been procuring MV/LV transformers with guaranteed reduced iron losses since 1983.

A major project currently undertaken by HEDNO SA to that end is the gradual elimination of the old system of 150-22-6.6 kV in Attica and the transfer of the load to the system of 150/20 kV. This project consists of sub-projects that will be completed in eight years, and their cost is estimated to be EUR 40 million. By replacing 22/6.6 kV and 6.6/0.4 kV transformers with 150/20 kV and 20/0.4 kV transformers, respectively, and by replacing 6.6 kV lines with 20 kV lines, a significant reduction of losses will be achieved due to the transmission of power at a higher voltage. This equipment is old and requires high levels of maintenance.

The projects which are underway and aim both at a more efficient and economical operation of the network and a balanced satisfaction of its users (consumers, producers and suppliers), are summarised below.

- Installation of a distribution management system in Attica. This includes a new supervisory control and data acquisition (SCADA) system, where data are stored and made available in network management applications (DMS). The installation of the system has been in progress since 2010 and is expected to be completed in 2017. The system will dynamically connect 107 Substations and Distribution Centres in Attica, and medium to low voltage substations, and also switches to the distribution network and will enable real-time monitoring of the distribution network and load management. The project budget stands at EUR 5.5 million.

- GIS integration into the distribution network. This project with a budget of EUR 7.5 million is designed to optimise management of the distribution network; it was launched in 2013 and is expected to be completed in 2015.

- Implementation of the ongoing telemetry project for large low-voltage customers with an agreed power of more than 55 kVA (over 60,000 customers) and pilot implementation of smart meter installation in 160 000 small low-voltage customers for telemetry and management of their demand, in view of the gradual replacement of 80% of existing meters with smart meters, which is in the tendering phase.

In conclusion, the Operational Programme of HEDNO SA provides for the gradual streamlining of the distribution network in line with the aforementioned directive, but financial incentives should be given for its completion, either through the methodology of calculating network user charges or otherwise.

ANNEX A: ANNUAL REPORT PURSUANT TO THE ENERGY EFFICIENCY DIRECTIVE

1. GENERAL

This report is Greece's second annual report on the progress achieved towards national energy efficiency targets, as set out in Article 24(1) of Directive 2012/27/EU. The analysis below shows all of the information provided for in Annex XIV, Part 1 'General framework for annual reports' of Directive 2012/27/EU, as well as additional information necessary for the interpretation of the evolution of specific figures.

The data presented in this study are also based on the statistics from Eurostat and the Greek Statistical Authority (ELSTAT). An extensive verification and cross-check of available information extracted from all sources was made in order to identify any discrepancies.

2. NATIONAL ANNUAL DATA

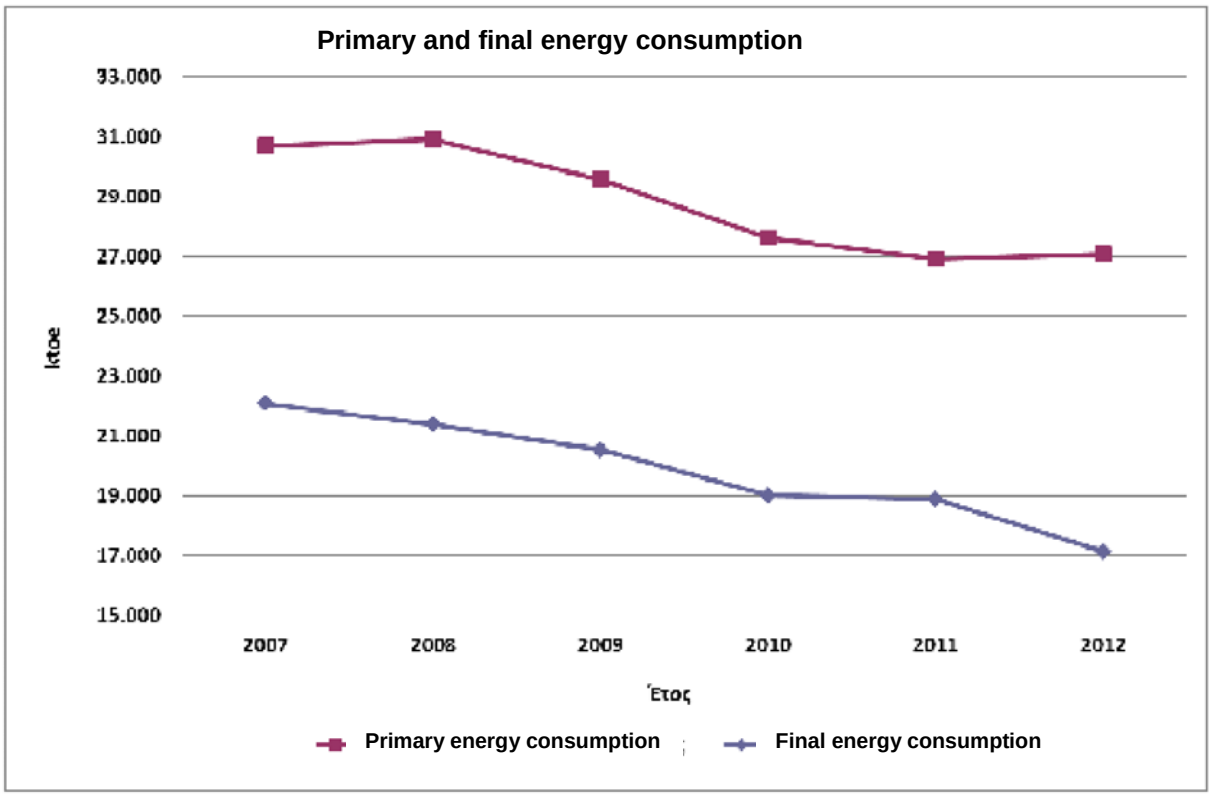
2.1. Energy information

According to the official data from the Ministry of Environment, Energy and Climate Change and Eurostat, total primary energy consumption showed a downward trend over the period 2007-2012, with the exception of a slight increase in 2008 (Table 25 and Graph 1). More specifically, primary energy consumption showed a marginal 0.5% increase in 2012 compared to 2011, and an 11.8% decrease over the period 2007-2012. This increase is due to the fact that the reduction in final non-energy consumption (21.8%) is higher than the corresponding reduction in gross domestic energy consumption (0.2%).

Final energy consumption showed a significant reduction of 22.4% over the period 2007-2012. Final energy consumption showed a 9.2% reduction in 2012 compared to 2011.

Table 25: Primary energy consumption and final energy consumption over the period 2007-2012

ktoe	2007	2008	2009	2010	2011	2012
Primary energy consumption (Mtoe)	30,680	30,908	29,570	27,623	26,914	27,059
Gross domestic energy consumption	31,519	31,841	30,476	28,731	27,796	27,749
Final non-energy consumption	840	933	906	1,108	883	690
Final energy consumption	22,060	21,378	20,530	19,003	18,873	17,129

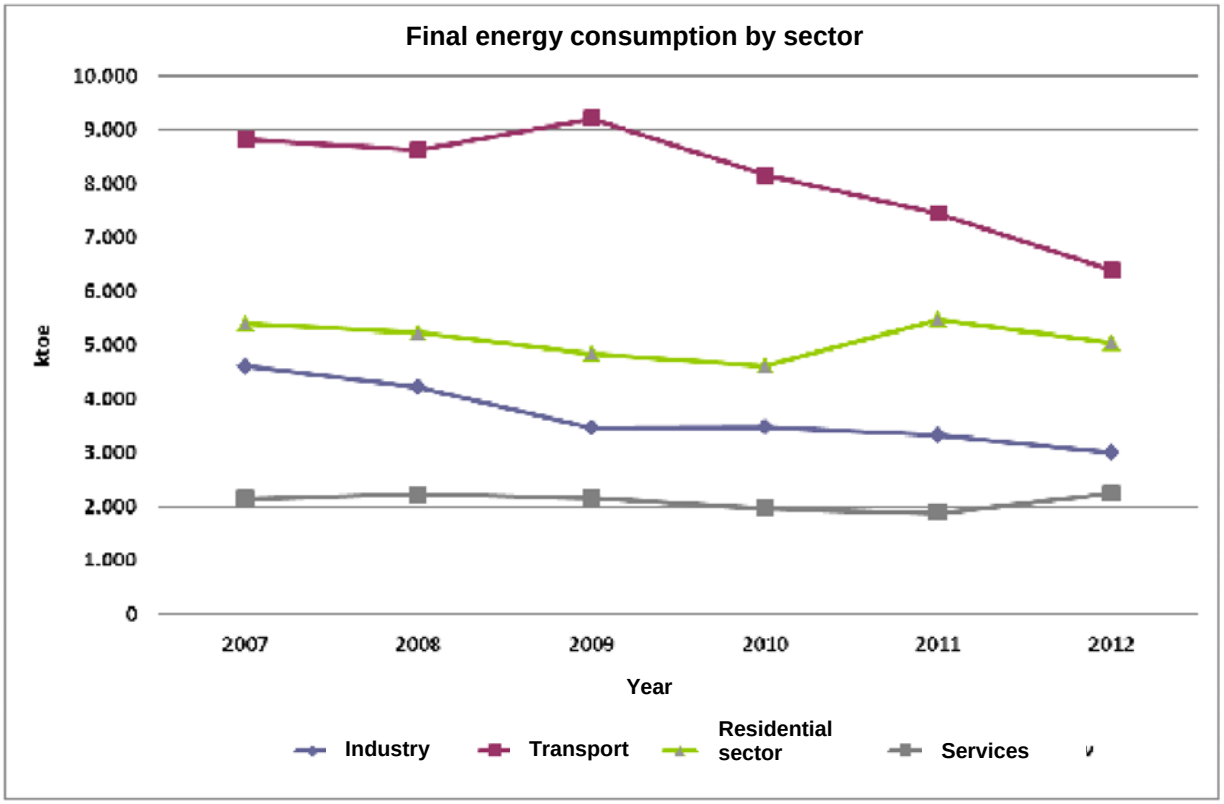


Graph 1: Primary and final energy consumption

The evolution of final energy consumption over the period 2007-2012 is of further interest if it is analysed by sector of economic activity (Table 26 and Graph 2), as additional information and conclusions on final energy consumption can be made.

Table 26: Final energy consumption by sector over the period 2007-2012 (* Sectoral analysis does not include final energy consumption in the agricultural sector)

Final energy consumption* (ktoe)	2007	2008	2009	2010	2011	2012
Industry	4,604	4,212	3,461	3,471	3,323	2,998
Transport	8,822	8,619	9,206	8,158	7,446	6,380
Residential sector	5,395	5,230	4,837	4,617	5,472	5,043
Services	2,136	2,219	2,151	1,956	1,871	2,233



Graph 2: Final energy consumption by sector

In particular, final consumption in the industrial sector showed a 9.8% decrease in 2012 compared to 2011, and a 34.9% decrease over the period 2007-2012. Moreover, the transport sector showed a 14.3% decrease, in 2012 compared to 2011, and a 27.7% total decrease over the period 2007-2012. The residential sector showed a similar trend, with a 7.9% decrease in final energy consumption in 2012 compared to 2011, and a 6.5% decrease over the period 2007-2012.

The opposite trend was shown by the services sector, where there was a 19.4% increase in 2012 compared to 2011, and a 4.5 increase over the period 2007-2012.

More specifically, Table 27 presents a breakdown of final energy consumption by fuel and energy source in the services sector for the period 2007-2012. As can be seen in Table 27, there is a 103.3% increase in the consumption of oil products in 2012 compared to 2011, following a 44.5% decrease in the period 2007-2011. Despite an upward trend of 57% shown throughout the period 2007-2011, natural gas consumption decreased by 16.3% in 2012 compared to 2011. Similarly, an increasing trend was seen in RES consumption over the period 2007-2012; specifically, it showed a 34.4% increase in 2012 compared to 2011. Finally, after having shown an increase from 2007 to 2009, electricity consumption decreased both in 2010 and 2011 leading to an overall 10.4% decrease in 2007-2011. However, it showed a 9.8% increase in 2012 compared to 2011.

Table 27: Final energy consumption by energy type in the tertiary sector over the period 2007-2012.

Fuel-Energy type (ktoe)	2007	2008	2009	2010	2011	2012
Solid fuel	0	0	0	0	0	0
Natural gas	105	129	145	139	165	138
Oil	412	393	293	255	229	465
RES	5	4	13	15	31	42
Electricity	1,614	1,693	1,700	1,548	1,446	1,588
Heat	0	0	0	0	0	0
Total	**2,136**	**2,219**	**2,151**	**1,956**	**1,871**	**2,233**

2.2. Economic and demographic data

The official data from ELSTAT and Eurostat demonstrate the clear impact of the economic recession on the Greek economy during the period under consideration. This is also demonstrated by the economic indicators listed in Table 28. All sectors of economic activity show a decrease in Gross Value Added, particularly for the period 2009-2012 when the impact of the economic recession was being felt in the real economy.

Despite the annual increase in the service sector for the period 2007-2009 which was 7.2% in 2008 and 2.8% in 2009, this trend reversed in the following years with a drop of 4.9% in 2010 as compared to 2009 and of 5.0% in 2011 as compared to 2010. A similar trend was also shown in 2012 as compared to 2011, when there was a 7.6% decrease in Gross Value Added. The total decrease for the period 2007-2012 was 8.0% (graph 3).

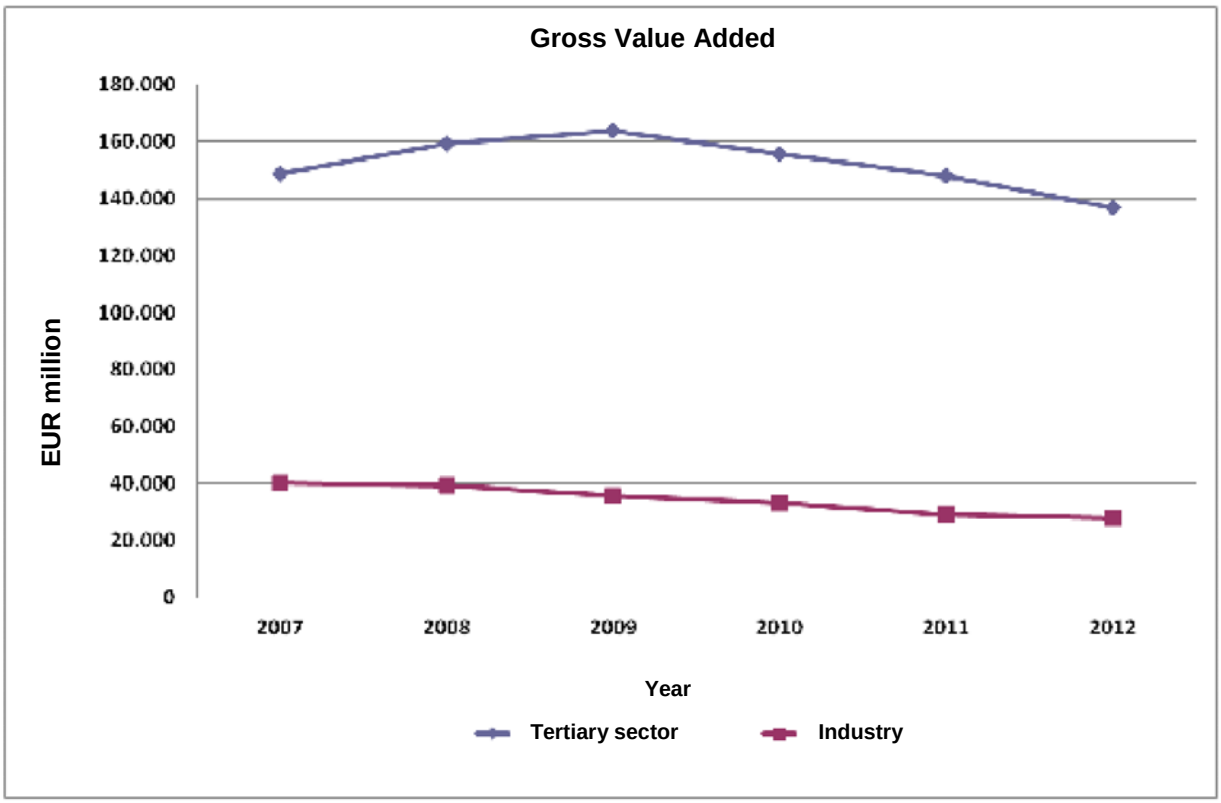
The industrial sector shows an overall sharp decline in Gross Value Added for the period 2007-2011 of 30.2% for the period 2007-2012, whereas the decrease observed in 2012 as compared to 2011 in Gross Value Added is 3.3%. (Graph 3).

The development of the Disposable Income of households appears to follow Gross National Product which shows a continuous annual decrease in the period 2008-2012, with the exception of the period 2007-2008 where there is a slight increase. The total reduction in the disposable income of households amounts to 10.9% and in the gross domestic product to 13.2% in the period 2007-2012, whereas in 2012 there is a partial reduction in the disposable income of households of 3.9% and in the gross domestic product of 7.1% compared to 2011. (Graphs 4 and 5).

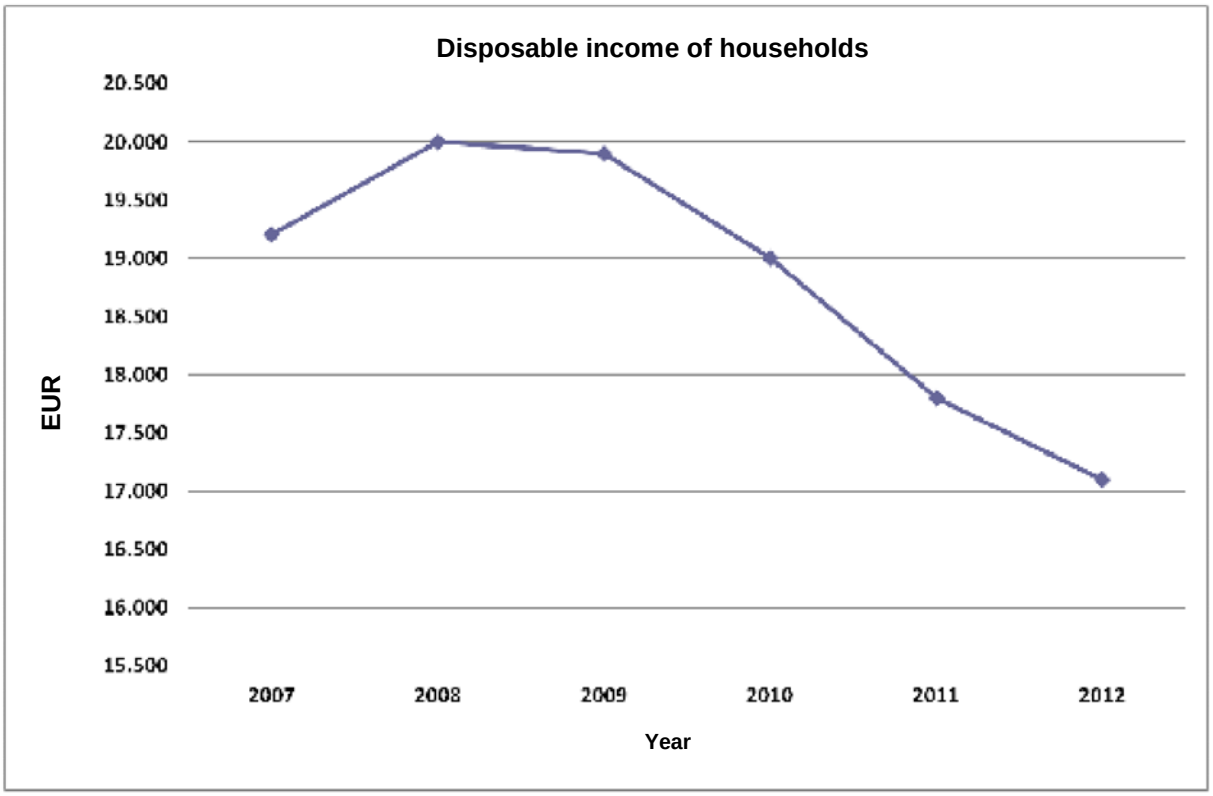
Finally, population shows a steady increase during the period 2007-2009, but shows a steady annual decline of 0.3% between 2010 and 2012 (Graph 6).

Table 28: Economic and demographic indicators of the Greek economy

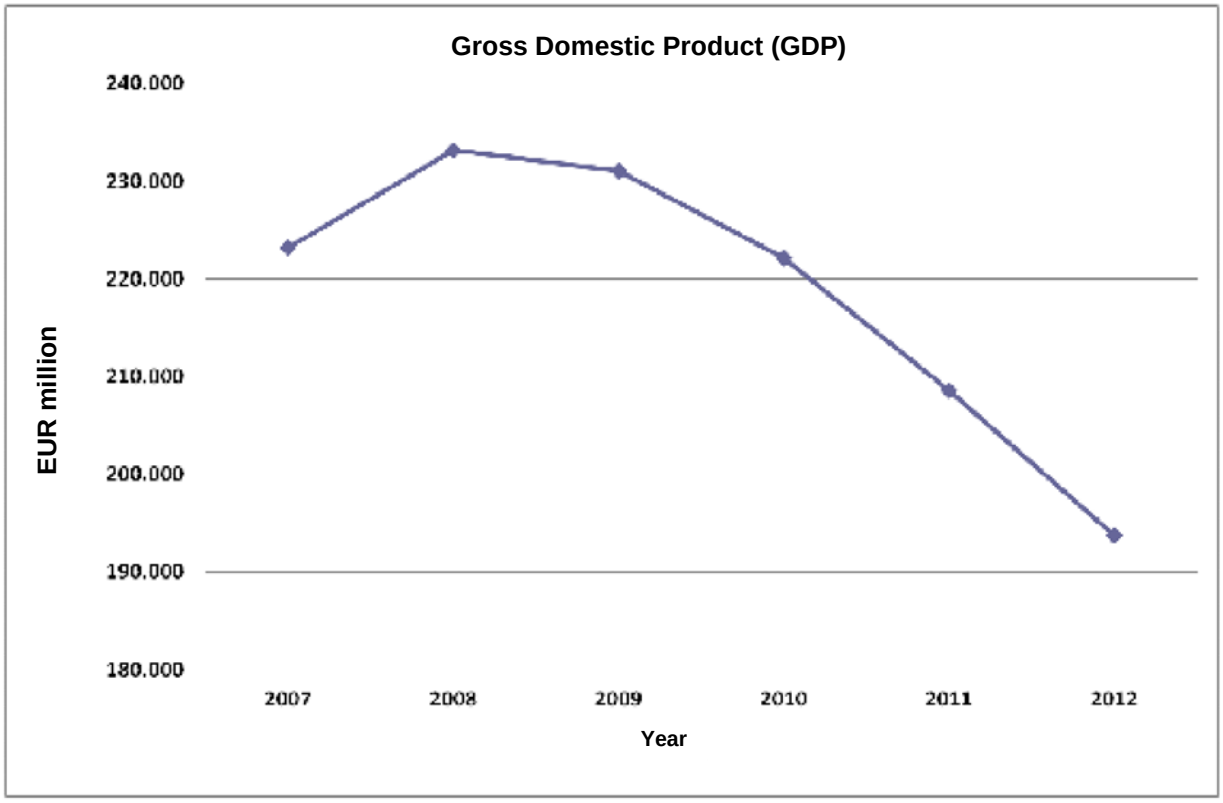
	2007	2008	2009	2010	2011	2012
Gross value added of industry (EUR million, current prices)	40,126	39,292	35,680	33,143	28,963	28,020
Gross value added of services (EUR million, current prices)	148,666	159,349	163,850	155,779	147,999	136,750
Gross disposable income of households per capita (EUR)	19,200	20,000	19,900	19,000	17,800	17,100
Gross Domestic Product (GDP) (EUR million, current prices)	223,160	233,198	231,081	222,152	208,532	193,749
Population (residents)	11,163,002	11,186,439	11,187,085	11,153,454	11,123,213	11,092,771



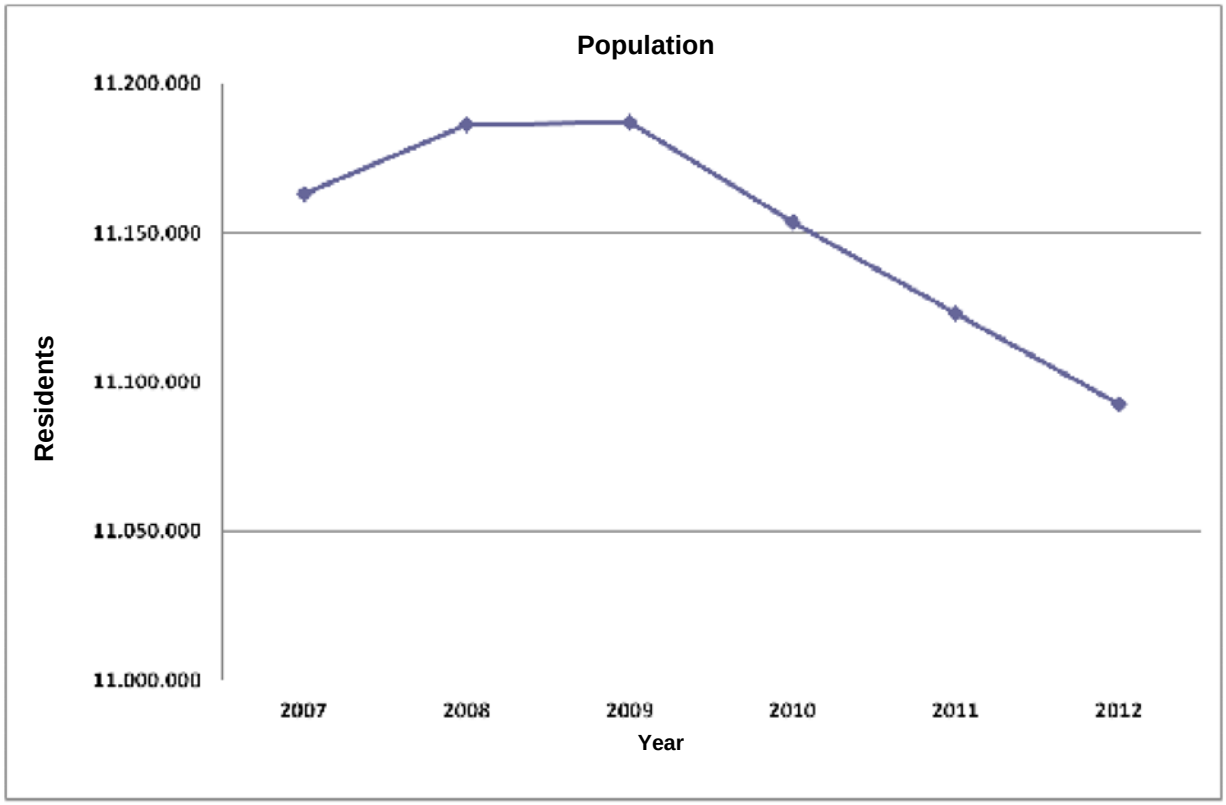
Graph 3: Gross Value Added



Graph 4: Disposable income of households.



Graph 5: Gross Domestic Product.



Graph 6: Population.

2.3. Data for the transport sector

Eurostat's statistics on transport loads in the transport sector are also of interest (Source: EU Transport in figures, Statistical Pocketbook 2013, European Commission). In particular, according to Table 29 and Graphs 7-10, passenger kilometres of passenger vehicles, the METRO, ATHENS PIRAEUS ELECTRIC RAILWAYS (ISAP) AND TRAM in the metropolitan area of Athens, and rail transport showed a decrease of 1.3%, 1.1% and 28.3%, respectively in 2011 as compared to 2010. On the contrary, passenger kilometres of buses showed a marginal increase of 0.3% in 2011 as compared to 2010. Taking into account Graph 2, demonstrating a significant reduction in final energy consumption in the transport sector, it is necessary to further investigate the methodology for the calculation of passenger kilometres through new research in the transport sector. The new methodology should take into account, to a greater extent, the particular economic and social conditions caused by the economic downturn, reflecting their actual impact on passenger movement and leading to more accurate estimations of specific figures.

Freight transport by road and rail showed a 33.4% and 42.7% decrease respectively in 2011 as compared to 2010.

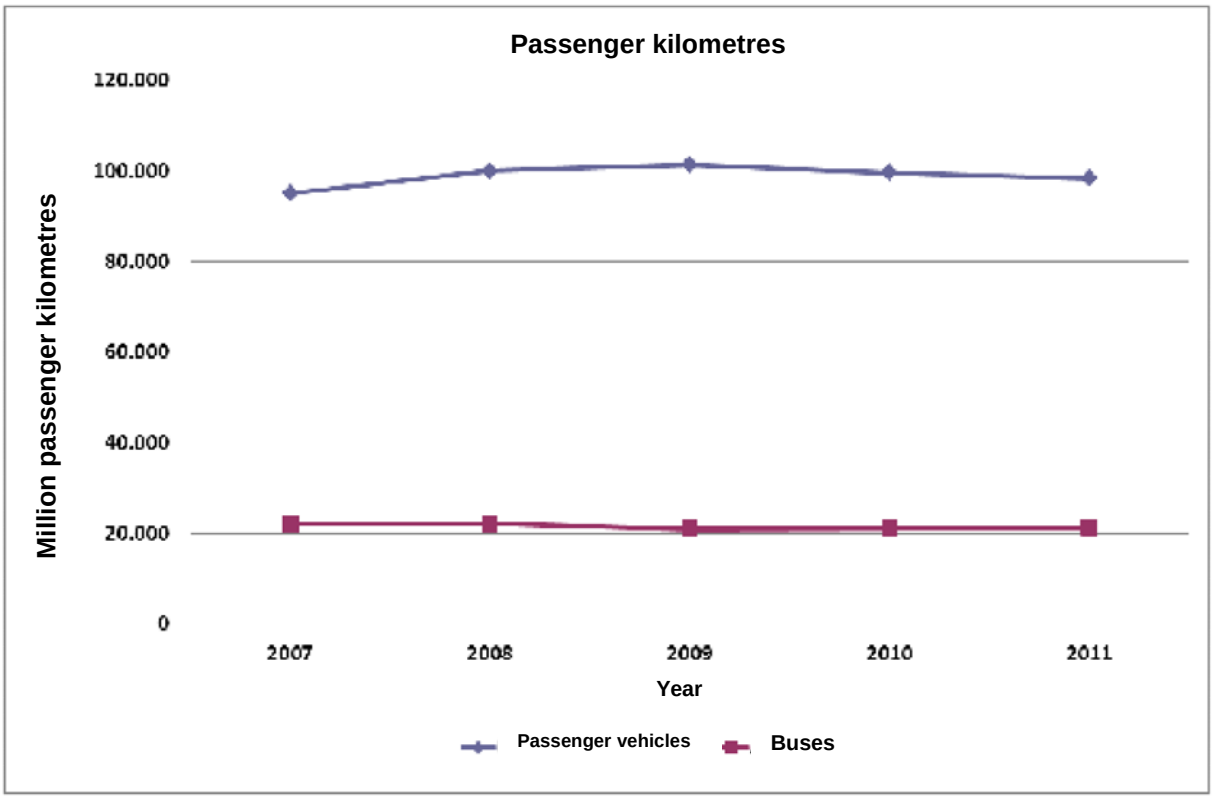
In total, the combined transport kilometres fell by 6.9% in 2011 as compared to 2010.

As these are estimations and projections of transport loads from previous studies (note the lack of available data for 2012), it is neither feasible nor safe to draw further conclusions as to the qualitative characteristics of both freight and passenger transport loads.

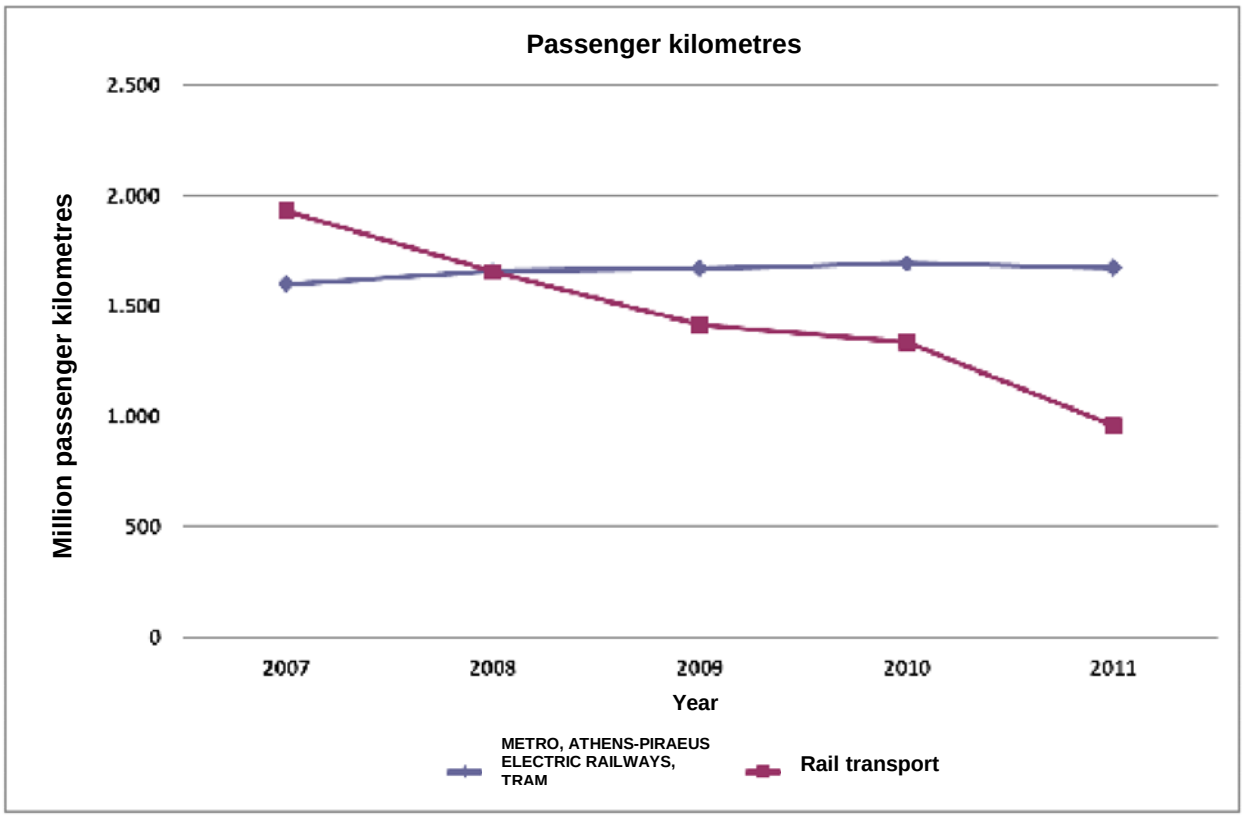
Table 29: Freight and passenger traffic per type of transportation (NA: Not Available).

	2007	2008	2009	2010	2011	2012
Passenger kilometres, passenger vehicles (million pkm)	95,000	100,000	101,300	99,600	98,322	NA
Passenger kilometres, buses (million pkm)	22,000	22,100	20,919	21,100	21,162	NA
Passenger kilometres, METRO/ATHENS PIRAEUS ELECTRIC RAILWAYS (ISAP) & TRAM (million pkm)	1,600	1,660	1,671	1,693	1,675	NA
Passenger kilometres, rail transport (million pkm)	1,933	1,657	1,414	1,337	958	NA
Total passenger kilometres	***120,533***	***124,417***	***125,304***	***123,730***	***122,116***	***NA***

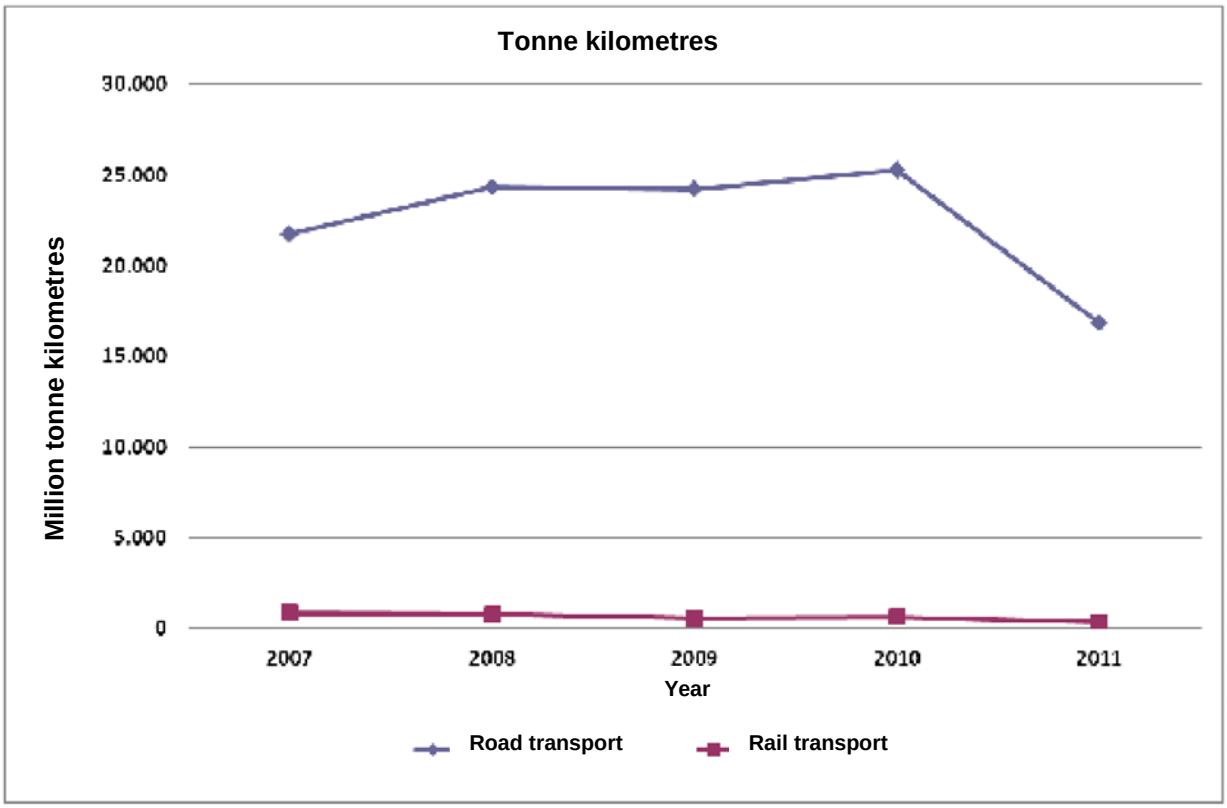
	2007	2008	2009	2010	2011	2012
Tonne kilometres, road transport (million tkm)	21,729	24,346	24,228	25,256	16,809	NA
Tonne kilometres, rail transport (million pkm)	835	786	552	614	352	NA
Total tonne kilometres (million tkm)	22,564	25,132	24,780	25,870	17,161	NA
Combined transport kilometres (pkm + tkm)	143,097	150,549	150,084	149,600	139,277	NA



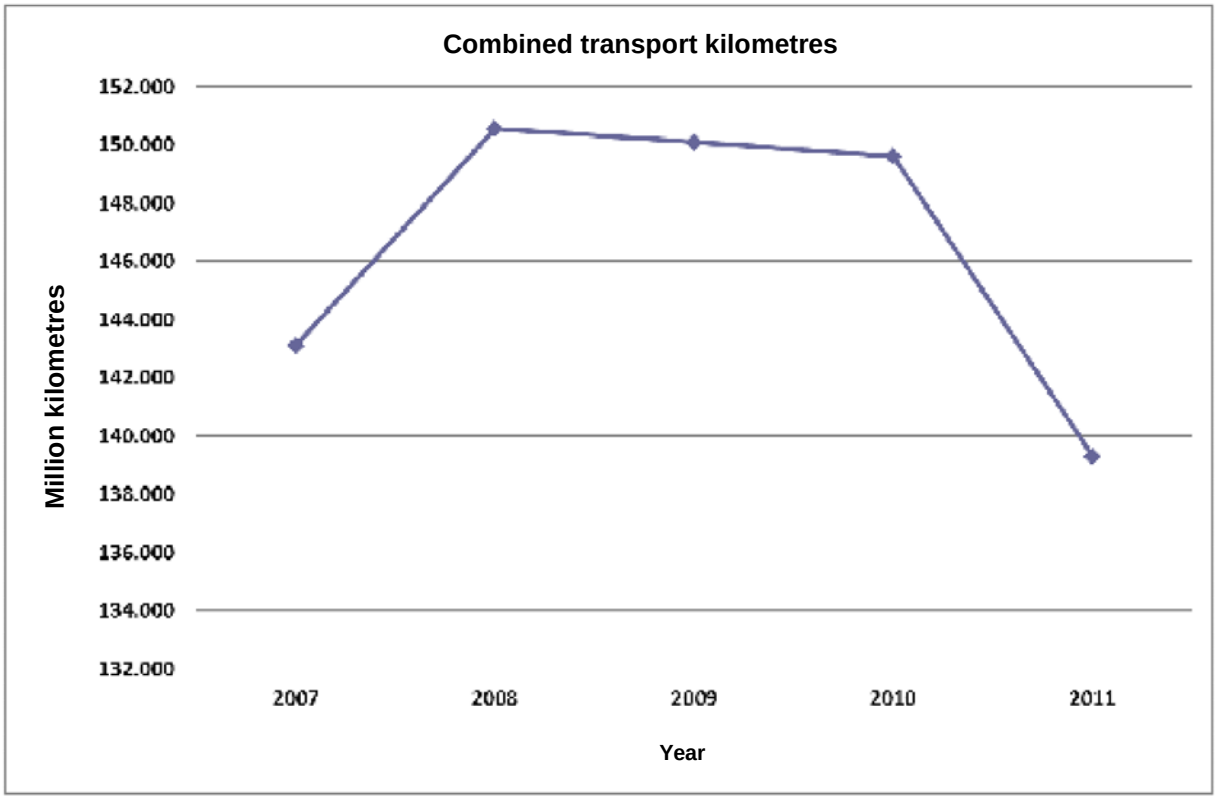
Graph 7: Passenger kilometres of passenger vehicles and buses.



Graph 8: Passenger kilometres, METRO/ATHENS PIRAEUS ELECTRIC RAILWAYS (ISAP) & TRAM and rail transport



Graph 9: Tonne kilometres by type of transport.

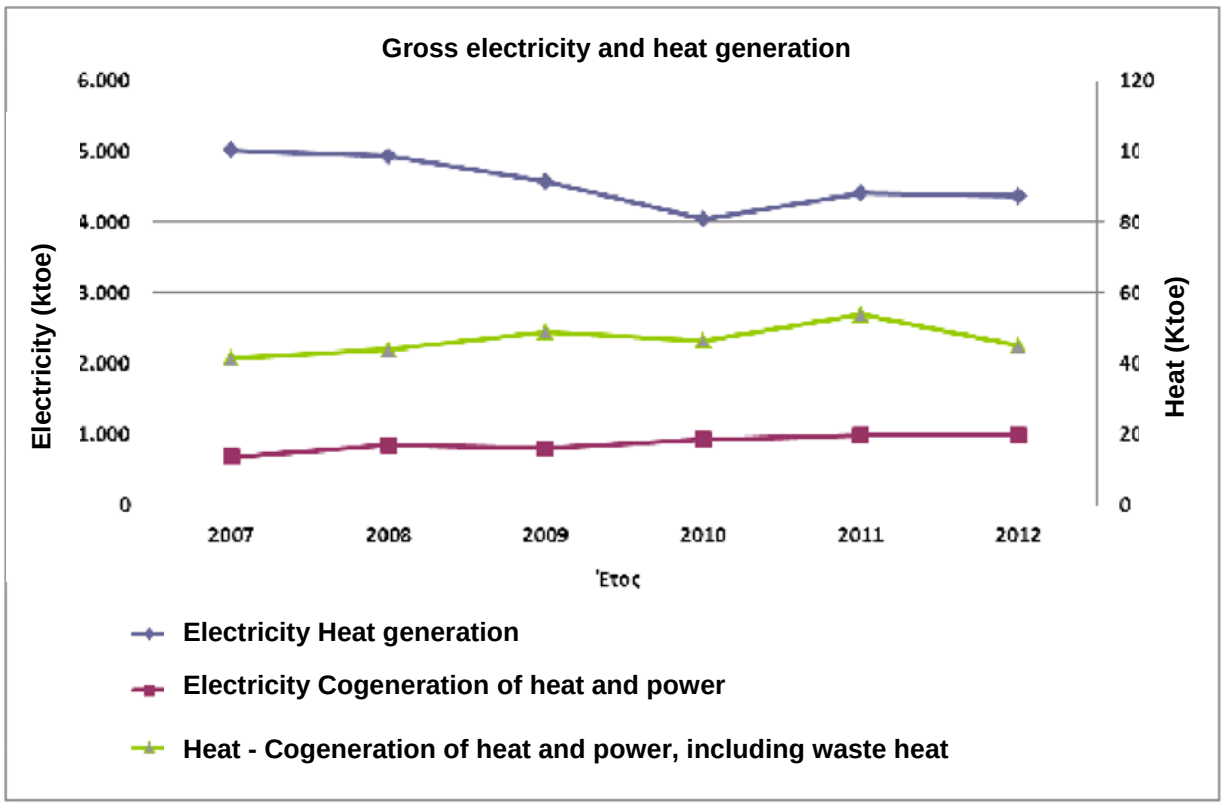


Graph 10: Combined transport kilometres.

2.4. Heat and power data

According to official data from the Ministry of the Environment, Energy and Climate Change and from Eurostat, electricity generation from thermal power plants (Graph 11) showed a decreasing trend from 2007 to 2010, leading to a reduction of 19.3%. After a temporary increase of 8.9% in electricity production in 2011 as compared to 2010, there was a further reduction in 2012 compared to 2011 of around 0.8%. The total decrease for the period 2007-2012 amounts to 12.8%.

Electricity and heat generation through combined heat and power (CHP) plants showed an increase in the period 2007-2011 amounting to 45.2% and 8.7% respectively. Electricity generation increased by 0.9% in 2010 as compared to 2010, whereas heat generation decreased by 16.3% in the same period.



Graph 11: Gross electricity and heat generation.

Table 30 presents the types of fuel and energy consumed by thermal power plants over the period 2007-2012.

Table 30: Fuel consumption by thermal power plants.

Fuel-Types of energy (ktoe)	2007	2008	2009	2010	2011	2012
Solid fuel	8,333	7,945	8,223	7,567	7,681	7,912
Natural gas	2,453	2,495	1,817	2,061	2,390	2,216
Oil	2,187	2,150	1,632	1,255	1,225	1,221
RES	33	33	55	47	57	73
Industrial Waste	6	4	4	32	28	15
Total	**13,011**	**12,627**	**11,730**	**10,961**	**11,381**	**11,438**

The use of solid fuels in thermal power plants declined by 5.1% in the period 2007-2012, whereas an increase of 3.0% was observed in 2012 as compared to 2011. A similar sustained declining trend is observed in the case of oil with a total reduction of 46.4% in the period 2007-2012. The use of oil in thermal power plants decreased by 0.3% in 2012 as compared to 2011. Natural gas showed a steadily increasing penetration, with the exception of a decline in 2009, and this upward trend continued until 2011. However, the use of natural gas decreased by 7.3% in 2012 as compared to 2011, and the total decrease for the period 2007-2012 is 9.6%.

The increasing trend in the use of Renewable Energy Sources (RES) is also noteworthy since, despite the 2010 reduction, RES use increased by 29.9% in 2012 as compared to 2011 mainly due to the increase in the use of biogas from landfills. The overall increase in the use of RES by thermal power plants in the period 2007-2012 was 124.5%.

Finally, in spite of the seven-fold increase recorded in 2010 as compared to 2009, the use of industrial waste decreased by 47.0% in 2012 as compared to 2011.

ANNEX B: DESCRIPTION OF ALTERNATIVE POLICY MEASURES

M1. 'Save Energy at Home' programme

The 'Save Energy at Home' programme provides incentives for citizens to make the most interventions which are most important to improve the energy efficiency of their home. Specifically, the programme provides home owners with capital subsidy and low interest loans combined with an interest rate subsidy and covers the cost of energy inspections.

'Save Energy at Home' programme	
Participating parties	Ministry of Environment, Energy and Climate Change, Ministry of Development and Competitiveness, National Fund for Entrepreneurship and Development (ETEAN), energy inspectors, suppliers, installers and home owners
Targeted sectors	Residential sector
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 83.8 ktoe.
Period of implementation	The implementation period of the measure will be from 2011 to 2015 The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing window frames and installing shading systems Installing thermal insulation in the building envelope, including the flat roof/roof and 'pilotis' Upgrading the heating and hot water system
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	Monitoring and verification of the energy target is achieved through energy inspections by energy inspectors included in the Register of Energy Inspectors.
Inspection protocol	ETEAN S.A. and the Energy Inspection Departments of Northern and Southern Greece of the Environment, Building, Energy and Mining Inspectorate of YPEKA conduct sample checks to verify the proper implementation of interventions and energy inspections.

M2. 'SAVE' Programme

The 'SAVE' Programme for Local Authorities concerns implementing actions and recognised good practices to reduce energy consumption in the urban environment, with emphasis on the building sector (public buildings) and the upgrade of public spaces and, secondly, in the municipal and private transport sector, as well as in energy-intensive municipal facilities. This will be achieved through the implementation of technical interventions, awareness-raising actions and mobilisation of citizens, local government, businesses and bodies.

'SAVE' Programme	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Ministry of Development and Competitiveness, the Ministry of Interior, the Municipalities and the Centre for Renewable Energy Sources and Saving (CRES), as the intermediary in the project implementation
Targeted sectors	Local authorities
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 3.7 ktoe.
Period of implementation	The implementation period of the measure will be from 2011 to 2015 The lifetime of the measure is more than ten years.
Eligible categories of measures	Eligible categories of intervention are: <u>Municipal buildings</u> Energy upgrade of the building envelope through actions, such as exterior insulation, replacement of glazing and window frames, installing roofing, awnings and special coatings to provide protection from the sun. Energy upgrade of electro-mechanical heating and cooling installations Upgrade of the natural/ artificial lighting system Installing energy management system in buildings (BEMS) <u>Communal areas</u> Integrated energy saving and management interventions in municipal lighting Bioclimatic interventions to improve microclimate and energy efficiency in urban areas. <u>Transport</u> Interventions in municipal fleet vehicles to improve their energy efficiency

	Urban mobility studies Transport studies Technical infrastructure Improving energy efficiency of Municipalities' technical infrastructure, including biological treatment of waste, pumping stations, etc. Dissemination, networking and information Networking and informing energy managers and officials of Municipalities Changing energy behaviour and raising awareness in the local community
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted, as well as by the municipalities' technical services.
Inspection protocol	CRES, as an intermediary in the Program, conducts sample checks to verify that interventions are correctly implemented.

M3. 'SAVE II' Programme

The Programme for improving energy efficiency in Local Authorities' existing buildings and infrastructure ('SAVE II') concerns implementing actions and recognised good practices to decrease energy consumption in existing buildings and infrastructure.

'SAVE II' Programme	
Participating parties	The Ministry of Environment, Energy and Climate Change and 1st Grade Local Authorities (Municipalities)
Targeted sectors	Local government
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 8.3 ktoe.
Period of implementation	The implementation period of the measure will be from 2011 to 2015. The lifetime of the measure is more than ten years.
Eligible categories of measures	Energy upgrade of the building envelope through actions, such as exterior insulation, replacement of glazing and window frames, installing roofing, awnings and special coatings to provide protection from the sun Energy upgrade of EM installations Upgrade of the natural/ artificial lighting system

	Installing energy management system (BEMS) Interventions in the energy upgrade of technical infrastructure/ other facilities of LAs.
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted as part of the Programme, as well as by the Municipalities' technical services
Inspection protocol	The Special Service for Coordination and Implementation of Actions in the Fields of Energy/National Resources, as an intermediary body, conducts sample checks to verify that interventions are implemented correctly.

M4. Energy upgrade of residential buildings

The measure provides home owners with capital subsidy and low interest loans combined with an interest rate subsidy and covers the cost of energy inspection, enabling them to make the most effective interventions to improve the energy efficiency of their homes.

Energy upgrade of residential buildings	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Ministry of Development and Competitiveness, the Special Purpose Fund, energy inspectors, suppliers, installers and home owners
Targeted sectors	Residential sector
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 239.5 ktoe.
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing window frames and installing shading systems Installing thermal insulation in the building envelope, including the flat roof/roof and 'pilotis' Upgrading the heating and hot water system
Quality standards	The quality standards will be set by the Special Managing Service of the Programme

Monitoring and verification protocol	The energy target is monitored and verified by energy inspectors entered in the Register of Energy Inspectors.
Inspection protocol	The special purpose Fund and the Energy Inspection Departments of Northern and Southern Greece of the Environment, Building, Energy and Mining Inspectorate of YPEKA will conduct sample checks to verify the proper implementation of interventions and energy inspections.

M5. Energy upgrade of public buildings

The measure concerns implementing actions and recognised good practices to reduce energy consumption in existing buildings of the public and general public sector.

Energy upgrade of public buildings	
Participating parties	The whole central and general government, energy inspectors, suppliers and installers
Targeted sectors	Public sector and general government
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 12.8 ktoe.
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Energy upgrade of the building envelope Energy upgrade of EM installations Upgrade of the natural/ artificial lighting system Installing an energy management system Installing systems for Cogeneration of Heat and Power Installing Renewable Energy systems
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted as part of the Programme by the technical departments of the public bodies involved

Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M6. Energy upgrade of commercial buildings

The measure provides incentives through subsidising actions and recognised good practices to decrease energy consumption in existing commercial buildings by intervening effectively to improve their energy efficiency.

Energy upgrade of commercial buildings	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Ministry of Development and Competitiveness, the special purpose Fund, suppliers, installers and owners of commercial buildings
Targeted sectors	The tertiary sector, and in particular offices and stores
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 31.6 ktoe.
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Energy upgrade of the building envelope Energy upgrade of electro-mechanical installations Upgrade of the natural/ artificial lighting system Installing an energy management system Installing systems for Cogeneration of Heat and Power Installing Renewable Energy systems
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted as part of the Programme by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M7. Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard

The measure involves implementing energy management in public and general public sector agencies in accordance with the ISO 50001 standard, in order to manage, measure and constantly improve energy efficiency in their buildings and facilities.

Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard	
Participating parties	The whole of the public and general public sector, the buildings' energy managers and the bodies which certify the standard
Targeted sectors	Public sector and general government
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 28.1 ktoe.
Period of implementation	The implementation period of the measure will be from 2015 to 2020 The lifetime of the measure is more than ten years.
Eligible categories of measures	Energy management system based on ISO 50001
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	The calculation methodology to be used will be projected savings, using a standard saving factor of 10% of each building's final energy consumption and it will be verified in maintaining the standard.
Inspection protocol	Verification will take place in maintaining the standard

M8. Energy upgrade of commercial buildings through Energy Service Companies

The measure provides incentives to boost the business activity of Energy Service Companies (ESCOs) by creating specific financial means (guarantee or lending special purpose Fund), which improve the financial activity and/ or liquidity of the businesses concerned and enable them to implement energy performance contracts.

Energy upgrade of commercial buildings through Energy Service Companies	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Ministry of Development and Competitiveness, the special purpose Fund, Energy Service Companies, suppliers, installers and owners of commercial buildings
Targeted sectors	The tertiary sector, and in particular offices and stores
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 50.8 ktoe.
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Improving energy efficiency in energy-intensive facilities and infrastructure (e.g. industrial installations, hospitals, large office buildings, swimming pools, warehouses) as well as in entire disadvantaged areas Constructing energy-efficient buildings Energy planning of outdoor spaces Integrating the best energy generation technologies (Cogeneration of High-Efficiency Electricity and Heat and Renewable Energy Sources), as appropriate, meeting future demands for low-energy and low-emission buildings
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted as part of the Programme by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M9. Education and training actions for tertiary sector staff

The measure concerns education and training actions for tertiary sector staff to raise their energy awareness and improve their energy behaviour.

Education and training actions for tertiary sector staff	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Ministry of Development and Competitiveness, the special purpose Fund, and technical staff of commercial buildings
Targeted sectors	The tertiary sector, and in particular offices and stores
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 76.8 ktoe
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Education and training actions
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through an annual briefing by the buildings' energy consumption staff to the Programme's Special Managing Service
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M10. Developing smart metering systems for final electrical energy consumption

The measure involves replacing 80% of existing conventional electricity meters (7 200 000 * 80% = 5 760 000 meters) of the final electrical energy consumption in the Hellenic Electricity Distribution Network with respective smart metering systems, which provide more information than conventional meters and include telemetry for consumption, remote control, two-way communication with consumers and the use of multiband invoices 24 hours a day. The development of smart systems to distribute electrical energy is expected to greatly facilitate planning and coordination for the purpose of balancing demand with energy generation, as it will allow new market mechanisms to develop (e.g. flexible energy invoices, load management programmes), further contributing to energy saving.

Smart metering systems for final electrical energy consumption will be installed in both the residential and the tertiary sectors.

Developing smart metering systems for final electrical energy consumption	
Participating parties	The Ministry of Environment, Energy and Climate Change, the Hellenic Electricity Distribution Network Operator and the electrical energy consumers
Targeted sectors	Residential and tertiary sectors
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 96.8 ktoe
Period of implementation	The implementation period of the measure will be from 2014 to 2020 The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing existing conventional electricity consumption measurement systems with respective smart meters
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	Monitoring and verification of the energy target is achieved through an annual briefing by the buildings' energy consumption staff to the Programme's Special Managing Service
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M11. Replacing old public and private light trucks

The purpose of the measure is to replace old public and private light trucks meeting EURO III standards with new vehicles meeting EURO V standards. Private new technology light trucks (up to 2 000 cc), bought in place of old ones, will be partially or wholly exempted from the specific registration fee.

Replacing old public and private light trucks	
Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, the Ministry of Administrative Reform and e-Governance, public bodies and the private sector.
Targeted sectors	The whole public and private sector
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 11.3 ktoe
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing old public and private light trucks which meet EURO III standards with new vehicles which meet EURO V standards.
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	Monitoring and verification of the energy target will be ensured by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M12. Replacing old private passenger vehicles

The measure aims at replacing public and private old passenger vehicles which meet EURO III standards with new vehicles which meet EURO V standards. Under the measure, private new technology passenger vehicles (up to 2000 cc) bought in place of old ones, will be partially or wholly exempted from the specific registration fee. Old vehicles are sent for scrapping (retired) under the approved system for alternative management of End-of-Life Vehicles (ELVs).

Replacing old private passenger vehicles	
Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles
Targeted sectors	Private sector (private vehicle owners)
Level of energy saving target	The total new energy savings in the period 2011-2015 are estimated to be 22.7 ktoe

Period of implementation	The implementation period of the measure will be from 2011 to 2015. The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing old private passenger vehicles which meet EURO III standards with new vehicles which meet EURO V standards.
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	Monitoring and verification of the energy target will be ensured by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M13. Promotion of CNG and LPG-powered passenger vehicles

This measure involves the provision of incentives to facilitate the market penetration of private passenger vehicles fuelled by compressed natural gas (CNG) or liquefied petroleum gas (LPG).

CNG and LPG-powered passenger vehicles	
Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles
Targeted sectors	Private sector (private vehicle owners)
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 10.4 ktoe
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Changing the fuel used by existing private passenger vehicles from petrol to liquefied petroleum gas (LPG) or natural gas (CNG)
Quality standards	The quality standards will be set by the Special Managing Service of the Programme
Monitoring and verification protocol	Monitoring and verification of the energy target will be ensured by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M14. OPESD Operations

This measure includes operations designed to save energy financed under the Operational Programme 'Environment and Sustainable Development'. These operations are detailed in the sections below.

OPESD Operations	
Participating parties	The whole central and general government, energy inspectors, suppliers and technical staff of commercial buildings.
Targeted sectors	Public sector and general government
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 14.2 ktoe
Period of implementation	The implementation period of the measure will be from 2011 to 2015. The lifetime of the measure is more than ten years.
Eligible categories of measures	Eligible measures per operation are presented in the following sections
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through the studies submitted as part of the Programme by the Special Managing Service of the Programme
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M15. Thessaloniki Metro development

This measure concerns the construction of an underground railway (metro) in Thessaloniki, to serve passengers and thereby replace private means of transport. Specifically, the Thessaloniki metro includes 13 modern stations with a central platform, 9.6 kilometres of lines with two independent single-track tunnels, 18 super-automatic state-of-the-art trains, automated gate systems on each station's platforms to ensure the best service and maximum safety for passengers, the creation of a depot area of 50 000 m2 and the construction of underground garages with a total capacity of 3 700 parking spaces. In addition, the construction contract for the Thessaloniki metro extension to Kalamaria was signed in June 2013 and includes 4.78 kilometres of lines and 5 stations.

Thessaloniki Metro development	
Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, Athens Metro S.A. and passengers in Thessaloniki
Targeted sectors	Passengers in Thessaloniki
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 21.4 ktoe
Period of implementation	The implementation period of the measure will be from 2017 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Development of the underground railway (metro), to serve passengers and thereby replace private means of transport
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through an annual briefing by the competent energy manager to the Programme's Special Managing Service
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M16. Extension of Athens Metro

This measure involves extending the Athens underground (metro), to serve passengers and thereby replace private means of transport.

Extension of Athens Metro	
Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, Athens Metro S.A. and passengers in Athens
Targeted sectors	Passengers in Athens
Level of	The total new energy savings

energy saving target	in the period 2017-2020 are estimated to be 29.3 ktoe
Period of implementation	The implementation period of the measure will be from 2013 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Development of the underground railway (metro), to serve passengers and thereby replace private means of transport
Quality standards	The quality standards have been set by the Special Managing Service of the Programme
Monitoring and verification protocol	The energy target is monitored and verified through an annual briefing by the competent energy manager to the Programme's Special Managing Service
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the Special Service of the Programme

M17. Offset of fines on illegal buildings against energy upgrades

The measure stems from the application of Article 20 of Law 4178/2013 'Tackling illegal building - Environmental Balance and other provisions' (Government Gazette, Series I, No 174, 08-08-2013), which provides that the amounts paid for services rendered, work and materials for the energy upgrade of buildings can be offset against the sums of the special fine set, up to 50% of the fine. Offsetting is possible if the interventions upgrade the building by at least one energy category, or achieve annual primary energy savings greater than 30% of the consumption of the relevant building.

Offset of fines on illegal buildings against energy upgrades	
Participating parties	The Ministry of Environment, Energy and Climate Change, energy inspectors, suppliers, installers and home owners
Targeted sectors	Residential sector
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 107.8 ktoe
Period of implementation	The implementation period of the measure will be from 2014 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Energy upgrade interventions to the building envelope, including the window frames, and the heating, cooling, air-conditioning and hot water systems

Quality standards	Implementation of interventions based on the minimum requirements of the Regulation on the Energy Performance of Buildings (KENAK)
Monitoring and verification protocol	Monitoring and verification of the energy target is achieved by conducting two energy inspections to the building (before and after implementation of interventions)
Inspection protocol	Proper implementation of interventions will be verified through sample checks conducted by the competent Building Service or other competent authority set by decision of the Minister for Environment, Energy and Climate Change

M18. Energy managers in public sector and general government buildings

This measure will be applied after revaluation of JMD Δ6/Β/14826 (Government Gazette, Series II, No 1122, 17-06-2008) 'Measures to improve energy efficiency and energy savings in the central and general government, whereby the concept of energy manager in the central and general government is introduced for the first time. Moreover, this JMD details the powers of energy managers and allocates the responsibility for implementing this measure to specific competent public bodies.

This measure will be implemented in a fixed number of buildings, and the energy manager may be responsible for one or more buildings of each body, in accordance with operational needs, the total staff capacity, the usable area and the volume of the body's buildings.

Energy managers in public sector and general government buildings	
Participating parties	Ministry for Environment, Energy and Climate Change, Ministry of Interior, Ministry of Development and Competitiveness, the whole central and general government, and the buildings' energy managers
Targeted sectors	Public sector and general government
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 52.6 ktoe
Period of implementation	The implementation period of the measure will be from 2014 to 2020. The lifetime of the measure is more than ten years

Eligible categories of measures	The responsibilities of the energy manager include: (1) collecting data on the energy consumption of buildings, (2) keeping a mandatory file or database on the energy consumption of the building, (3) preparing an annual summary report on energy-saving tracking and monitoring in accordance with the procedures, requirements and guidelines for conducting energy inspections required by Joint Ministerial Decision Δ6/Β/οικ. 11038/1999 (Government Gazette, Series II, No 1526, 08-07-1999), (4) verifying the proper operation of central heating and cooling installations and conducting periodic maintenance of boilers-burners and air conditioning units, (5) monitoring maintenance or repair works to improve energy efficiency.
Quality standards	the Secretaries General of the Ministries of Interior and of Development set quality standards for monitoring implementation of the measure.
Monitoring and verification protocol	The calculation methodology to be used will be projected savings, using a standard saving factor of 5% of each building's final energy consumption and it will be verified during the annual summary report on energy-saving tracking and monitoring
Inspection protocol	Monitoring of implementation in each building of the central and the general government is carried out by the Secretary General of each Ministry by which the body concerned is supervised or to which it reports, who must inform the Secretaries General of the Ministry of Interior and the Ministry of Development, in writing and at regular intervals

ANNEX C: METHODOLOGY FOR DETERMINING ENERGY SAVINGS ACHIEVED BY THE INDIVIDUAL OPERATIONS

The methodology for determining energy savings achieved is analysed by policy measure.

M1. 'Save Energy at Home' programme

The calculation methodology to be used will be scaled savings and it consists of estimating the achieved savings in final energy consumption based on primary energy savings, which will be calculated while preparing the EPCs for the residential homes where the interventions will be implemented.

The country's climate variability will be taken into account in the energy inspection and issuing of EPC.

The Programme concerns interventions in buildings and provides for the issuing of an Energy Performance Certificate (EPC). The methodology used for calculating energy savings is based on analysing and evaluating the EPC data issued in connection with the Programme. Specifically, after processing the results of the EPCs from buildings on which all the programme's interventions have been fully implemented, it appears that the average saving on primary energy consumption achieved by the Programme is 163.9 kWh/m^2. Moreover, the average surface area of the buildings in the Programme is 106.7 m^2. In order to calculate the final energy savings, the conversion factors under Ministerial Decision No Δ6/B/off. 5825 'Adoption of Regulations on Energy Efficiency in Buildings' are used to convert the final energy consumption of a building to primary energy (Table 31).

Table 31: Conversion factors of final energy into primary energy.

Energy source	Conversion factor into primary energy
Heating oil	**1.10**
Electrical energy	**2.90**

Source: Ministerial Decision No Δ6/B/off. 5825 'Adoption of Regulations on Energy Efficiency in Buildings', Table B1.

Given that the majority of interventions implemented through the programme concern measures to reduce the home heating load, 80% of the total primary energy savings represents thermal energy and 20% electrical energy.

In view of the above, the savings per m2 of a residential building are calculated as follows:

$$ESf = ESp^* (PEt/CFh + PEe/ CFe) \quad (5)$$

where:

ESf: Final energy savings

ESp: Primary energy savings

CFh: Conversion factors for converting final heating oil energy into primary energy

CFe: Conversion factors for converting final electrical energy into primary energy

PEt: Percentage of thermal energy savings

PEe: Percentage of electrical energy savings

Consequently, the final energy savings amount to:

163,9 kWh/m^2*(0,8/1,1+0,2/2,9) = 130,5 KWh/m^2.

It is estimated that during the time the measure is in force (2011-2015), 70 000 homes with an average surface area of 106.7 m2/home will join the Programme. The total energy savings amount to:

130.5 KWh/m^2*106.7 m^2/home*70 000 homes = 975.0 GWh or 83.8 ktoe

The average energy savings per home amount to:

83.8 ktoe/70 000 homes = 0.0012 ktoe/home

M2. 'SAVE' Programme

The calculation methodology to be used will be scaled savings and it consists of the assessment made by the technical service or the technical adviser of the municipality, and that service or advisor will be monitored by the CRES and will have been designated as an intermediary in the Programme.

The target calculation methodology is based on the analysis and evaluation of the data in the technical sheets of proposals submitted under the Programme. By processing the results obtained from the analysis of the interventions specified in the technical proposal sheets from the 104 municipalities which joined the "SAVE" programme, the savings per priority axis resulting from the implementation of the interventions are presented in Table 32.

Table 32: Primary energy savings during implementation of interventions

Axis	Primary energy savings (ktoe)
Axis 1: Buildings - Technical sheets of proposals	2.35
Axis 2: Street lighting - Technical sheets of proposals	2.56
Axis 3: Infrastructure - Technical sheets of proposals	1.05
Total primary energy savings	5.96

In the conversion of primary energy into final energy, depending on the impact of each axis on the thermal and electrical loads of municipalities, the percentages of the total primary energy savings presented in Table 33 represent thermal and electrical energy savings.

Table 33: Percentage of primary electrical and thermal energy savings

Axis	Savings percentage (%)	
	Thermal Energy	Electrical Energy
Axis 1: Buildings - Technical sheets of proposals	80	20
Axis 2: Street lighting - Technical sheets of proposals	-	100
Axis 3: Infrastructure - Technical sheets of proposals	100	-

Taking into account the conversion factors for converting final energy consumption into primary energy and equation (5) set out in the methodology for calculations under the 'Saving Energy at Home' Measure (point 4.1), the resulting savings amount to:

ESf: 2,35 ktoe*(0,8/1,1+0,2/2,9) + 2,56 ktoe/2,9 + 1,05 ktoe/1,1 = 3,7 ktoe

The average energy savings per municipality amount to:

3.7 ktoe/104 municipalities = 0.036 ktoe / municipality

M3. 'SAVE II' Programme

The calculation methodology to be used will be scaled savings involving an assessment made by the technical service or technical adviser of the Municipality, which will be monitored by the Special Service for Coordination and Implementation of Actions in the Fields of Energy, National Resources and Climate Change of the Ministry of Environment, Energy and Climate Change which is designated as an intermediary in the Programme.

The 'SAVE LA II' Programme is orientated towards interventions which concern Municipalities' building facilities and provides for the issuance of an EPC. The target calculation methodology is based on the analysis and evaluation of the data in the EPCs issued under the Programme and the energy savings are estimated according to the methodology developed in the 'Saving Energy at Home' Measure.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

After processing the results from issuing EPCs in the 36 Municipalities which have joined the Programme so far, it can be seen that the primary energy savings from the implementation of the interventions are equal to 2.71 ktoe.

Taking into account the conversion factors for converting final energy consumption into primary energy and the equation (5) set out in the methodology for calculations under the 'Saving Energy at Home' Measure (point 4.1), the resulting savings are:

2,71 ktoe*(0,8/1,1+0,2/2,9) = 2,16 ktoe

The average energy savings per municipality are:

2.16 ktoe/36 municipalities = 0.060 ktoe / municipality

Before the measure expires, a total of 139 Municipalities are expected to join. Consequently, the total final energy savings resulting from the measure's implementation are:

0,060 ktoe/Municipality*^ Municipalities = 8,3 ktoe.

M4. Energy upgrade of residential buildings

The calculation methodology to be used will be scaled savings and will involve the estimation of the savings achieved in final energy consumption, based on primary energy savings which will be calculated while preparing the energy performance certificates (EPCs) for homes where interventions will be implemented.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

The target calculation methodology is based on the use of the results of the estimation under

the 'Saving Energy at Home' Measure, according to which the average energy savings from implementing the 'Saving Energy at Home' measure are 0.0012 ktoe per house.

The measure is expected to be implemented in 200 000 homes leading to final energy savings of

0.0012 ktoe/house*200 000 houses= 239.5 ktoe.

M5. Energy upgrade of public buildings

The calculation methodology to be used will be scaled savings which involves the estimation, by a technical service or technical adviser, of the savings in final energy consumption achieved, based on the primary energy savings which will be calculated while preparing the energy performance certificates (EPCs) for public buildings where interventions will be implemented.

The target calculation methodology is based on the analysis and evaluation of the data from Energy Performance Certificates (EPCs) issued for office buildings in the tertiary sector. Specifically, after processing the results from the EPCs issued for office buildings, the average specific consumption was calculated per square meter (m^2), taking into account the climate zone of the buildings examined. The specific primary energy consumption is 410 kWh/m^2.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

Taking into account the conversion factors for converting final energy consumption into primary energy and the equation (5) set out in the methodology for calculations under the 'Saving Energy at Home' Measure (point 4.1), the resulting savings are:

410 kWh/m^2*(0,8/1,1+0,2/2,9) = 326,5 kWh/m^2

The energy upgrade of public sector buildings will be implemented through a combination of interventions to improve energy efficiency, with the resulting energy savings being equal to 65% of total energy consumption, in order to fulfil the obligations under Directive 2010/31/EU on Energy Performance of Buildings in combination with the obligations under Article 5 of Directive 2012/27/EU on Energy Efficiency.

Consequently, the final energy savings are:

326.5 kWh/m^2*65% = 212 kWh/m^2

The estimated average surface area of public sector office buildings is 2 500 m^2. The measure is expected to be implemented in 280 buildings leading to final total energy savings of:

212 KWh/m^2*2 500 m^2/building*280 buildings = 148.4 GWh or 12.8 ktoe

M6. Energy upgrade of commercial buildings

The calculation methodology to be used will be scaled savings which involves the estimation, by a technical service or technical adviser, of the achieved savings in final energy consumption based on the primary energy savings which will be calculated while preparing the energy performance certificates (EPCs) for buildings where interventions will be implemented.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

The target calculation methodology is based on the analysis and evaluation of the data from Energy Performance Certificates (EPCs) issued for office buildings in the tertiary sector. Specifically, after processing the results from issuing EPCs in relation to buildings in the tertiary sector, and taking into account the climate zone of the buildings examined, the weighted specific primary energy consumption in the specific categories of buildings equals 550 kWh/m^2.

The final energy consumption is calculated taking into account the conversion factors used to convert final energy consumption into primary energy and equation (5) set out in the methodology of calculation under 'Saving Energy at Home' Measure.

More specifically, the specific final energy consumption in tertiary sector buildings is:

550 kWh/m^2*(0,8/1,1+0,2/2,9) = 438 kWh/m^2

It is estimated that 3 500 buildings with an average surface of 600 m^2 will join the programme and measures will be implemented to improve energy efficiency which will potentially lead to energy savings in the region of 40%. Therefore, the resulting final energy savings are:

438 KWh/m^2*600 m^2/building * 3500 buildings*40% = 368 GWh or 31.6 ktoe

M7. Implementing an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard

The calculation methodology to be used will be projected savings, using a standard saving factor of 10% of each building's final energy consumption and this will be verified during the process of maintaining the standard.

The target calculation methodology is based on the analysis and evaluation of the data from Energy Performance Certificates (EPCs) issued for office buildings in the tertiary sector.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

An energy management system is expected to be implemented in 4 000 public and general public sector buildings. Consequently, using the methodology and specific consumption described in the above measure 'Energy upgrade of public buildings': (specific final energy consumption of 326.5 kWh/m^2 and estimated average surface area for buildings of 2 500 m^2) and assuming a 10% decrease in final energy consumption, as evidenced by relevant bibliographic references to documented 10% decreases as a result of behavioural measures. (Guidance note on Directive 2012/27/EU, Article 5: Exemplary role of public bodies' buildings, Commission Staff Working Document and Achieving energy efficiency through behaviour change: what does it take?, EEA) the resulting total final energy savings are equal to:

4 000 buildings*326.5 KWh/m^2*2 500 m^2 = 326 GWh ή 28.1 ktoe

M8. Energy upgrade of commercial buildings through Energy Service Companies

The calculation methodology to be used will be scaled savings which will involve the calculation, by a technical service or technical adviser, of an estimate of the savings achieved in final energy consumption, based on the primary energy savings which will be calculated while preparing the energy performance certificates (EPCs) of commercial buildings where interventions will be implemented.

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

The target calculation methodology is based on analysing and evaluating the data from the Energy Performance Certificates (EPCs) issued for office buildings in the tertiary sector. Specifically, the weighted specific primary energy consumption, as derived from both the Energy Performance Certificates issued for categories of buildings in the tertiary sector and estimations from case studies, is 550 kWh/m^2. The final energy consumption is calculated taking account of the conversion factors used to convert final energy consumption into primary energy and the equation (5) set out in the methodology of calculation under the 'Saving Energy at Home' Measure.

Specifically, the resulting specific final energy consumption on the buildings in question is equal to:

550 kWh/m^2*(0,8/1,1+0,2/2,9) = 437,8 kWh/m^2

It is estimated that 3 000 buildings with an average surface of 1 000 m^2 will join the programme and measures will be implemented to improve energy efficiency which will potentially lead to energy savings in the area of 45%. Therefore, the resulting final energy saving is:

437.8 KWh/m^2*1 000 m^2/building*3 000 buildings*45% savings = 591 GWh or 50.8 ktoe

M9. Education and training actions for tertiary sector staff

The calculation methodology to be used will be projected savings using a standard saving factor of 10% of each building's final energy consumption.

The target calculation methodology is based on the estimation that a total of 40 000 tertiary sector technical staff working in various buildings will be educated, and it is assumed that 85% of them will be influenced by this and that this will result in a 10% reduction in final energy consumption, as evidenced by relevant bibliographic references supporting behavioural measures (Guidance note on Directive 2012/27/EU, Article 5: Exemplary role of public bodies' buildings, Commission Staff Working Document and Achieving energy efficiency through behaviour change: what does it take?, EEA).

Consequently, using the methodology and specific consumptions described in the Measure 'Energy Upgrade of commercial buildings' (specific final energy consumption of 437.8 kWh/m^2 and building's estimated average surface area of 600 m^2), the resulting final energy savings are calculated as:

40 000 buildings*85%*437.8 KWh/m^2*600 m^2 = 893 GWh ή 76.8 ktoe

The country's climate variability will be taken into account in the energy inspection process and the issuing of the EPCs.

M10. Developing smart metering systems for final electrical energy consumption

The calculation methodology to be used will be projected savings, using a standard saving factor of 8% of final energy consumption in the residential and tertiary sectors.

The target calculation methodology is based on the study by the Dutch consulting company in the energy sector DNV KEMA (Smart metering in Greece: Roadmap and cost benefit analysis, August 2012). Taking the above information into account and assuming that 95% of the meters will be installed in the residential sector, which consumed 1 516 ktoe of electrical energy in 2011, and the remaining 5% in the tertiary sector, which consumed 1 446 ktoe in 2011, the final energy savings are equal to:

80%*(95%*1.516 ktoe+5%*1.446 ktoe)*8% = 96,8 ktoe

M11. Replacing old public and private light trucks

The calculation methodology to be used will be projected savings, using a standard saving factor of 40% of petrol consumption due to the vehicles' replacement.

The target calculation methodology is based on data (from relevant references from the Association of Motor Vehicle Importers Representatives - AMVIR, statistical data and estimations by CRES studies, as well as market data) according to which the specific consumption of old light trucks is 15 lt/100 km, the specific consumption of new technology light trucks is 9 lt/100 km and the average distance covered by vehicles in this category is 25 000 km. Moreover, it is assumed that they are all petrol vehicles and that their replacement will not alter their use.

The following formula shows the resulting energy savings:

$$EEo = EK\pi * D - EKv * D \qquad (6)$$

where:

ESo: Energy savings

SCp: Specific energy consumption of old light trucks

SCn: Specific energy consumption of new light trucks

D: Annual distance covered

Consequently, energy savings amount to:

25 000 km/vehicle * (15 lt/ 100 km - 9 lt/ 100 km) = 1500 lt/ vehicle = 0.72 kg/lt * 1500 lt/vehicle = 1080 kg/vehicle

= 1080 kg/vehicle * 12.222 kWh/kg = 13200 kWh/vehicle or 0.0113 ktoe/vehicle

While this measure is in force, 10 000 vehicles are expected to be replaced, with resulting energy savings of:

0.00113 ktoe/vehicle * 10 000 vehicles = 11.3 ktoe

M12. Replacing old private passenger vehicles

The calculation methodology to be used will be projected savings, using a standard saving factor of 40% of petrol consumption due to the vehicles' replacement.

The target calculation methodology is based on estimating energy savings based on specific consumption and the average kilometres covered by these vehicles. According to existing data (from relevant references from the Association of Motor Vehicle Importers Representatives - AMVIR, statistical data and estimations by CRES studies, as well as market data), the specific consumption of old passenger vehicles is 10 lt/100 km, whereas the specific consumption of new technology passenger vehicles is 6 lt/100 km. The average distance covered by vehicles in this category is 15 000 km. Moreover, it is assumed that they are all petrol vehicles and that their replacement will not alter their use.

Equation (5), set out in the calculation methodology under the Measure 'Replacing old public and private light trucks', is used to calculate energy savings per vehicle:

15 000 km/vehicle * (10 lt/ 100 km - 6 lt/ 100 km) = 600 lt/ vehicle or 0.000464 ktoe/vehicle * 0.72 kg/lt * 600 lt/vehicle = 432 kg/vehicle

= 432 kg/vehicle * 12.222 kWh/kg = 5 279.9 kWh/vehicle or 0.000454 ktoe/vehicle

The measure concerns replacing 50 000 old passenger vehicles (according to relevant references from the Association of Motor Vehicle Importers Representatives - AMVIR), with resulting energy savings of:

0.000454 ktoe/vehicle * 50 000 vehicles = 22.7 ktoe

M13. Promotion of CNG and LPG-powered passenger vehicles

The calculation methodology to be used will be projected savings using the standard saving factors for specific fuel consumption and converting it into energy in the replaced vehicles.

The incentive to promote CNG and LPG-powered vehicles relates to infrastructure that will provide these vehicles with a 90% operating range.

The target calculation methodology is based on estimating energy savings based on specific consumption and the average kilometres covered by these vehicles.

According to existing data (from relevant references from the Association of Motor Vehicle Importers Representatives - AMVIR, statistical data and estimations by CRES studies, as well as market data), the specific consumption of a passenger vehicle using petrol is 10 lt/100 km. CNG and LPG vehicles are equipped with a dual-fuel engine and their specific consumptions are given in Table 34.

Table 34: Assumptions on the vehicles' specific consumption

LPG dual-fuel engine		**CNG dual-fuel engine**	
Liquefied Petroleum Gas (lt/100 km)	Petrol (lt/100 km)	Natural gas (lt/100 km)	Petrol (lt/100 km)
8	6.3	4.2	6.4

The physical and chemical properties of these fuels are listed in Table 35 so that consumption can be converted into a common, comparable consumption unit (kWh/100km).

Table 35: Physical and chemical properties

Fuel	**Specific Consumption**		**Special Weight (kg/m3)**	**NCV**	**Specific Consumption (kWh/100 km)**	
	Petrol	**LPG or CNG**			**Regular**	**Average**
Petrol	9.2 lt/100 km	-	-	8.8 kWh/lt	88.00	80.96
LPG	6.3 lt/100 km	8 lt/100 km	-	7.3 kWh/lt	56.50	
CNG	6.4 lt/100 km	4.2 kg/100 km	0.59	10.4 kWh/Nm3	72.13	64.32

These calculations were performed taking into account that the promotion of this measure will contribute to a 90% operating range for vehicles powered by alternative fuel.

The following data are taken into account in calculating the energy savings resulting from implementation of this measure:

- The average distance covered annually by vehicles in this category is estimated to be 15 000 km.
- Promotion of this measure will result in the replacement of 35 000 vehicles in the existing vehicle fleet by 2020.
- 80% (28 000 vehicles) of the total vehicle fleet will be replaced with new LPG and CNG vehicles.
- The remaining 20% (7 000 vehicles) relates to vehicles whose owners will convert the engine and substitute the fuel.
- The vehicle fleet will be replaced by LPG and CNG vehicles in equal numbers (17 500 LPG vehicles and 17 500 CNG vehicles).

The specific consumption of alternative fuel vehicles is increased by 5% due to the substitution in connection with the new LPG and CNG vehicles.

Equation (6) set out in the calculation methodology, under the Measure 'Replacing old public and private light trucks', as well as the above assumptions are used to calculate energy savings.

The energy consumption of the existing fleet is:

35 000vehicles * 88.00 kWh/100 km* 15 000 km = 461.7 MWh or 39.7 ktoe

The energy consumption of the new fleet is:

0.8*35 000 vehicles * 64.32 kWh/100 km *15 000 km + 0.2*35 000 vehicles * 64.32 kWh/100 km * 1.05 * 15 000 km = 340.8 MWh or 29.3 ktoe

Consequently, implementation of the measure will result in energy savings of:

39.7 ktoe - 29.3 ktoe = 10.4 ktoe

M14. OPESD Operations

Identification of the achieved savings in final energy consumption will be carried out by the competent agency of the Programme after completion of the individual operations, while the calculation methodology to be used will be either scaled savings or projected savings depending on the specificities of each operation. The achieved energy savings are estimated at 14.2 ktoe.

M15. Construction of Thessaloniki Metro

The calculation methodology to be used for energy savings achieved will be projected energy savings, based on facts on passenger movements, the replaced vehicle-kilometres, as well as the energy savings indicator per private vehicle passenger.

The target calculation methodology is based on a study by the company ATHENS METRO S.A. The study estimates the passengers served daily by the 13 stations, which is the main project, the extension to Kalamaria with 5 stations, and also the resultant replacement of private vehicles with the use of the underground railway network.

Specifically, the estimated daily passenger traffic in the 13 stations in the main work is 247 000 passengers, whereas in the 5 stations of the extension to Kalamaria it is 63 000 passengers. Consequently, the total daily passenger traffic in the stations will be:

310 000passengers.

The target calculation methodology is based on the estimation of energy savings based on specific consumption and average kilometres covered by vehicles replaced by the use of the underground railway network.

According to existing data, an average passenger vehicle's specific consumption is 9 lt/100km and the daily average distance covered per vehicle per passenger is 15.2 km.

Moreover, the kilometres covered by the vehicle are increased by a rate of 1.2 due to finding a parking space, a factor of 1.5 because of the ratio of passenger to private vehicle, i.e. 1 vehicle represents 1.5 passengers and 22% of the metro passengers who would otherwise use a private vehicle.

The following formula shows the resulting energy savings:

$$ESo=SCp*D – C1*C2 \qquad (7)$$

where:

ESo: Energy savings

SCp: Specific energy consumption of vehicles

D: Average distance covered daily

C1: coefficient of increase in distance due to finding a parking space

C2: correlation coefficient between passengers and private vehicles, consequently

15.2 km/vehicle *(9 lt/ 100 km)*1.2 / 1.5 private vehicle passenger/vehicle = 1.09 lt/ private vehicle passenger = 0.72 kg/lt *

1.09 lt/ private vehicle passenger = 0.78 kg/ private vehicle passenger = 0.78kg/ private vehicle passenger * 12.222 kWh/kg = 9.53 kWh/ private vehicle passenger or 0.00000082 ktoe/ private vehicle passenger

Assuming that 22% of the metro passengers used private vehicles before, the annual energy savings are:

310 000passengers/ day * 22% * 0.00000082 ktoe/ private vehicle passenger * 365 days/ year = 21.4 ktoe

M16. Extension of Athens Metro

The calculation methodology to be used for energy savings achieved will be projected energy savings, based on facts on passenger movements, the replaced vehicle-kilometres, as well as the energy savings indicator per private vehicle passenger.

The target calculation methodology is based on a study by the company ATHENS METRO S.A. The study estimates the numbers of passengers served daily by the Athens Metro since 2011 and the resultant replacement of private vehicles with the use of the underground railway network.

According to existing data, an average passenger vehicle's specific consumption is 9 lt/100km and the daily average distance covered per vehicle per passenger is 20 km. Moreover, the kilometres covered by the vehicle are increased by a factor of 1.2 due to finding a parking space, a factor of 1.3 because of the passenger/private vehicle ratio, i.e. 1 vehicle corresponds to 1.3 passengers and 22% of metro passengers who would otherwise use a private vehicle. Using equation 7 of Measure 'Development of Thessaloniki Metro' on the daily energy savings per vehicle results in the following formula:

20 km/vehicle *(9 lt/ per 100 km)*1.2 / 1.3 private vehicle passenger/vehicle = 1.66 lt/private vehicle passenger = 0.72 kg/lt * 1.66 lt/private vehicle passenger=1.2 kg/private vehicle passenger = 1.2kg/private vehicle passenger * 12.222 kWh/kg = 14.67 kWh/private vehicle passenger or 0.00000126 ktoe/private vehicle passenger

Assuming that 22% of metro passengers used private vehicles before, the annual energy savings will be:

290 000passengers/day * 22% * 29.3 ktoe/private vehicle passenger * 365 days/year = 29.34 ktoe

M17. Offsetting fines on illegal buildings with energy upgrades

The calculation methodology to be used will be scaled savings which involves estimating the achieved savings in final energy consumption based on primary energy savings, which will be calculated while preparing the EPCs for the residential homes where the interventions will be implemented.

It is estimated that approximately 90 000 residential homes will join this measure by 2020. It is also assumed that these homes will have the same characteristics as the homes included under the 'Saving Energy at Home' Programme and will implement similar interventions for energy efficiency improvement.

More particularly, the houses that will join the measure are estimated to have an average surface area of 106.7 m^2/ house and will implement interventions for energy efficiency improvement, which will result in final energy savings of 130.5 KWh/m^2.

Consequently, total energy savings will be:

130.5 KWh/m^2*106.7 m^2/house*90 000 houses = 1 253.5 GWh or 107.8 ktoe

M18. Energy managers in public sector and general government buildings.

The calculation methodology to be used will be projected savings, using a standard saving factor of 5% of each building's final energy consumption and this will be verified during the annual summary report on energy-saving tracking and monitoring. This energy saving is a conservative estimation of the anticipated energy savings that may result from implementation of behavioural measures, which was described in the measure concerning implementation of an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard.

The target calculation methodology is based on the assumption used both in the 'Energy upgrade of public buildings' Measure and the 'Implementation of an energy management system in public and general public sector agencies in accordance with the ISO 50001 standard' Measure (specific final energy consumption of 326.5 kWh/m^2 and estimated average surface area for buildings of 2 500 m^2).

Therefore, taking into account that this measure is estimated to be implemented in 15 000 buildings, the total energy savings amount to:

326.5 KWh/m^2*2 500 buildings *5% = 612.2 GWh or 52.6 ktoe