4TH NATIONAL ENERGY EFFICIENCY ACTION PLAN OF CYPRUS

DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 25 October 2012

on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

Nicosia

September 2017

Abbreviations

CERA = Cyprus Energy Regulatory Authority
EED = Energy Efficiency Directive (Directive 2012/27/EU)
EPBD = Energy Performance of Buildings Directive (Directive 2010/31/EU)
EPC = Energy Performance Certificate
EPC = Energy Performance Contracting
ES = Energy Savings
ESD = Energy Services Directive (Directive 2006/32/EC)
EU = European Union
GDP = Gross National Product
GPP = Green Public Procurement
MECIT = Ministry of Energy, Commerce, Industry and Tourism
NEEAP = National Energy Efficiency Action Plan
NEEP = National Energy Efficiency Programme
RAA = Regulatory Administrative Acts
RES = Renewable Energy Sources
SEAP = Sustainable Energy Action Plans
SME = Small and Medium-sized Enterprise
TOE = Tons of Oil Equivalent
toe= tons of oil equivalent
TSO = Transmission System Operator

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We also want to express our special thanks to Dr Theodoros Zachariadis, assistant professor at the Cyprus University of Technology, for his invaluable cooperation.

Introduction:

The present 4th National Energy Efficiency Action Plan was prepared in compliance with Article 24(2) of Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency (EED). Please note that the previous three NEEAPs were submitted in 2007, 2011 and 2014, respectively. Special efforts were made in preparing the 4th NEEAP to include as much data and information as possible on energy efficiency matters that are in progress in Cyprus.

Because of its national peculiarities, which make it a small and isolated system (an island country) without any interconnections to European or other energy networks (electricity, petroleum, natural gas) at present, Cyprus has attached great importance to energy efficiency improvement aiming, inter alia, to strengthen energy supply security, increase competitiveness and ensure sustainable development / environmental protection.

There is significant potential for end use energy efficiency, as also referred to in the three previous NEEAPs, especially in buildings, as confirmed by the energy savings results achieved by 2016 and those to be achieved by 2020.

The measures taken so far, combined with those expected to be taken in implementation of the EED and the EPBD, have allowed Cyprus to attain its end use energy savings target set for 2016 and indicate that it is also possible to attain the indicative primary energy savings target for 2020. Raising consumer awareness in conjunction with the measures promoted by Cyprus, since 2006 in particular, has contributed decisively to a reduction in the growth rate of energy consumed and has brought about positive results in terms of the economy and employment.

In preparing the 4th NEEAP, account was taken of the comments submitted during the public consultation held from .... to ....

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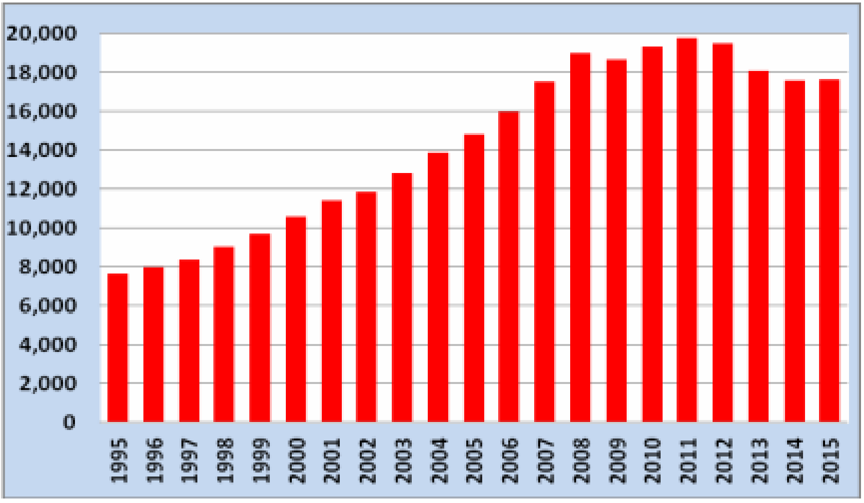
1. INTRODUCTION

1. Cyprus has experienced relatively steady growth rates in recent years, after the economic crisis of 2013. Up until 2012, the Cypriot economy experienced high growth rates thanks to private initiative, investment in construction and service exports. The highest growth was seen in construction, banking, real estate and international business units. The economy started shrinking in 2009 due to the impact of the global economic crisis, which affected Cyprus too, with a GDP growth rate of -1.75 % compared to 2008.

2. The economy kept shrinking from 2012 to 2014, with GDP rates of -1.3 %, -7 % and -3 %, respectively. Banking, real estate and construction were impacted the most by the economic crisis that broke out in Cyprus in 2013.

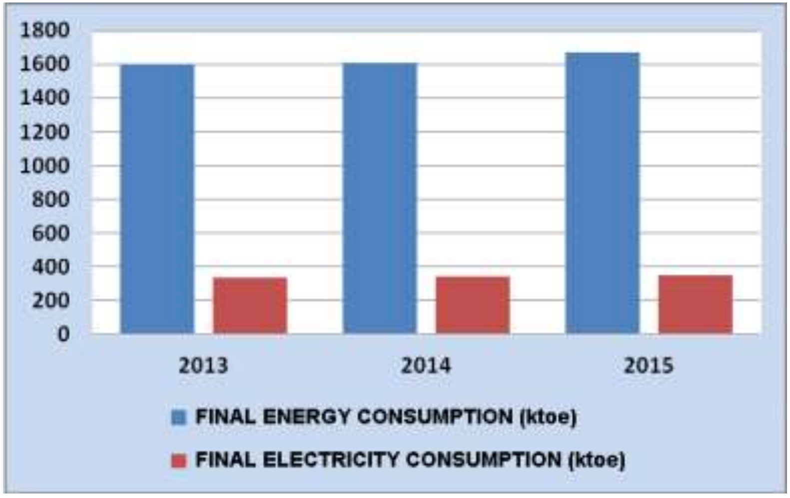
3. A marginal improvement of 0.4 % occurred in 2015 compared to 2014, the Cypriot economy showing signs of recovery.

Figure 1: Gross National Domestic Product of Cyprus 1995-2015 (EUR million).



4. The energy needs of Cyprus remained unchanged in 2013, 2014 and 2015, which was in line with the steady GDP in 2014 and 2015, which improved marginally by 0.4 %.

Figure 2: Final energy consumption 2013-2015 (ktoe).



5. Final energy consumption and the respective electricity consumption rose by 3.9 % and 2.5 %, respectively, in 2015 compared to 2014.

6. Being an isolated State in terms of energy, Cyprus is marked with high energy dependency (above the EU-27 average). The energy balance of Cyprus depends highly on the import of oil products for energy generation. Cyprus has certain peculiarities in respect of energy, e.g. isolated energy system, high energy supply costs, increased dependency on imported oil products, low energy supply security, seasonal fluctuations in energy demand (in summer months in particular). Also, the Cypriot market is very small and therefore, in conjunction with the relatively low energy generation from RES, the cost of imported oil products is very high.

Figure 3: Oil product imports 2005-2014 (EUR million).

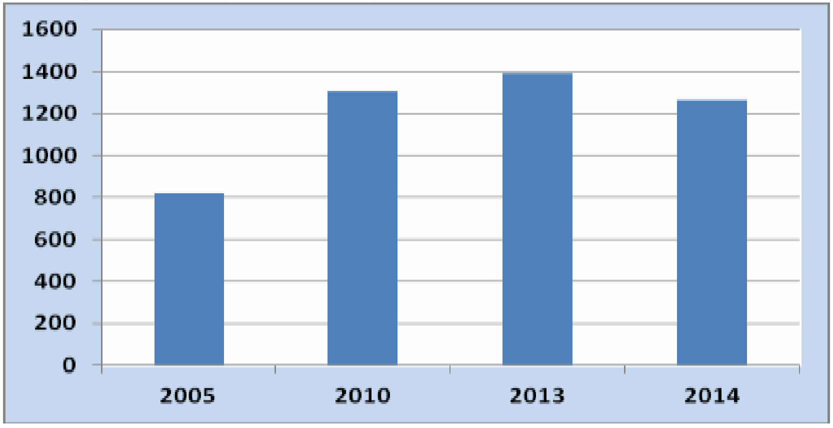
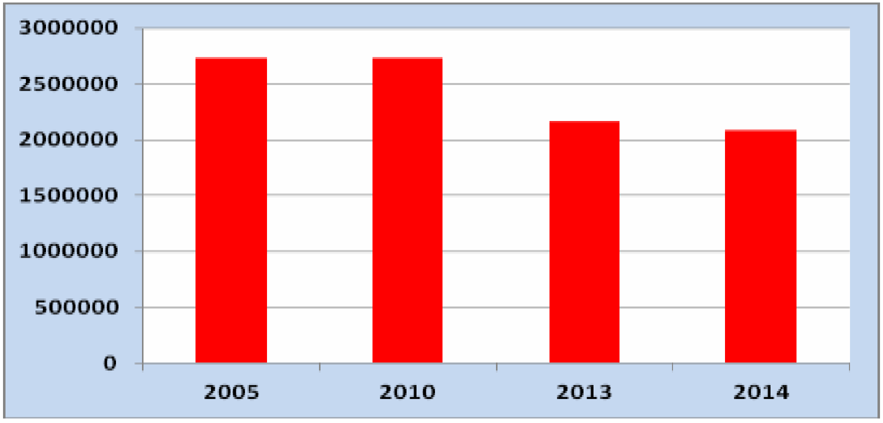


Figure 4: Oil product imports 2005-2014 (tonnes).



7. Oil product imports rose by approximately 40 % from 2005 to 2013. Imports dropped by approximately 9 % in 2014, primarily due to the economic crisis that occurred. Respectively, oil product sales were highly stable from 2005 to 2010. A significant drop in oil product sales of 20 % occurred in 2013. These sales remained rather unchanged in 2014 compared to 2013.

8. The total energy consumption was 1.6 million TOE in 2013. A similar energy consumption level was also recorded for 2014 (1.61 million TOE). The level recorded for 2015 was 1.67 million TOE. Oil products were used mostly (above 50 % of the total consumption of oil products) in the transport sector, in which approximately 875 000 TOE were consumed from 2013 to 2015. Approximately 528 000 TOE were consumed in other sectors (services, agriculture, households), whereas industry consumed an average of 220 000 TOE.

Figure 5: Final oil product consumption 2013-2015 (ktoe).

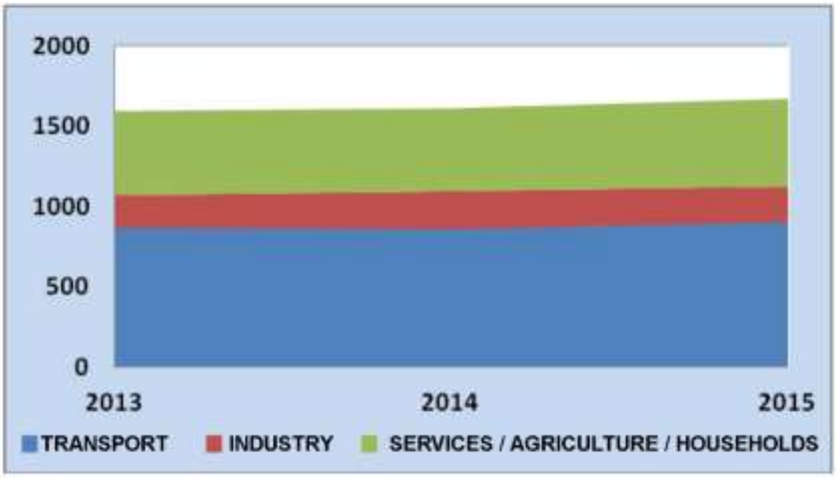


Figure 6: Final energy consumption by sector 2013.

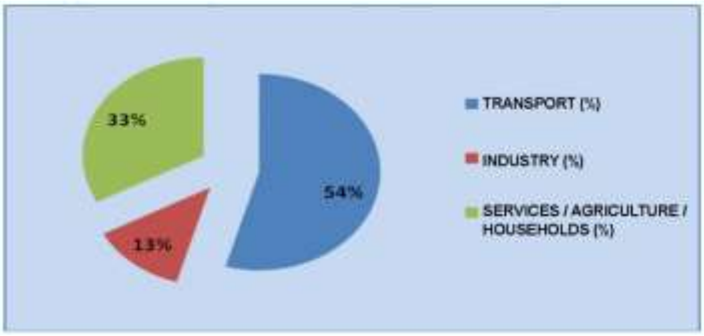


Figure 7: Final energy consumption by sector 2014.

Figure 8: Final energy consumption by sector 2015.

9. The use of solid fuels is still preferred by the domestic cement industry, despite the environmental impact of the combustion of such fuels and the international restrictions in place, primarily due to their competitive prices. A total of 101 784 TOE of solid fuels were consumed in 2013. A total of 126 773 TOE and 100 817 TOE were consumed in 2014 and 2015, respectively.

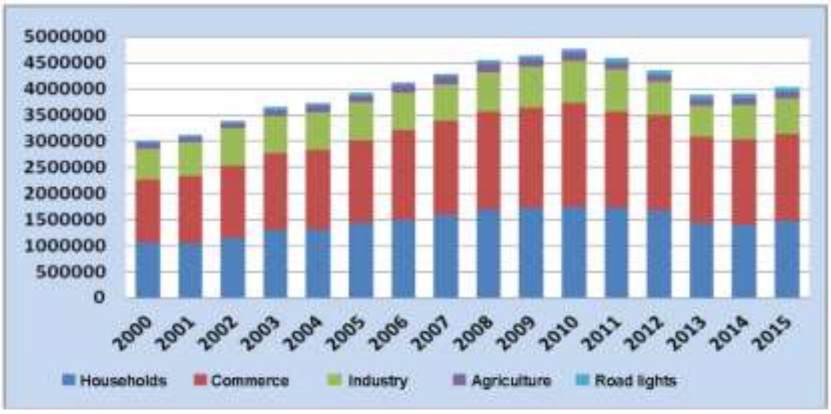
10. RES had a 7.9 % share, i.e. 126 813 TOE, in final energy consumption in 2013. Respectively, RES had an 8.1 % share (129 730 TOE) in final energy consumption in 2014 and an 8.6 % share (143 074 TOE) in 2015. In 2015, 67 857 TOE were consumed by solar thermal systems for hot water production, 34 379 TOE of electricity from RES were consumed, and 1 551 TOE of thermal energy generated by low-enthalpy

geothermal systems were consumed. Finally, 9 481 TOE of biofuels were consumed, i.e. 1.4 % of the energy content of the fuels consumed in road transport.

11. Electricity (generated both by conventional fuels and RES) represented 20.9 % (349 378 TOE) of the final energy consumption in 2015. The largest energy consumers in Cyprus are the residential and trade sectors, with an energy consumption of 1 476 GWh and 1 660 GWh in 2015, respectively. This represents an increase of 39.9 % and 36.5 % for each sector compared to 2000. Compared to 2012, this represents a 11.7 % and 9.6 % drop, respectively. The industrial sector, with a consumption of 594 MWh in 2000, recorded a 34 % increase up until 2011 (796 MWh), but then recorded a 13.9 % drop (686 MWh) between 2011 and 2015.

12. In 2010, energy consumption in the residential, trade and industrial sectors amounted to 1 737 GWh, 1 991 GWh and 816 MWh, respectively. The respective electricity consumption in 2012 amounted to 1 671 GWh (residential sector), 1 837 GWh (trade sector) and 632 MWh (industrial sector). In 2015, energy consumption amounted to 1 476 GWh, 1 660 GWh and 686 MWh, respectively. The significant drop in energy consumption in 2012 compared to 2010 is largely due to the energy crisis that hit Cyprus after the destruction of its largest power station (Vasilikos Power Station). The further drop in electricity in 2013 and the stable levels recorded from 2014 to 2015 are due to the economic crisis.

Figure 9: Electricity consumption by sector 2000-2015 (kWh).



13. The primary energy consumed in Cyprus amounted almost to 2.19 million TOE in 2013, whereas in 2015 it rose to 2.28 million TOE (4.1 % increase). In 2015, oil products still had the largest share in the final energy consumption with approximately 1.1 million TOE (66 %), followed by electricity with 349 378 TOE (19 %), solar energy and other RES (thermal energy and electricity) with 143 074 TOE (8 %), solid fuels with 100 817 TOE (6 %) and, finally, biofuels with 9 481 TOE (1 %).

Figure 10: Energy mix - final energy consumption 2013.

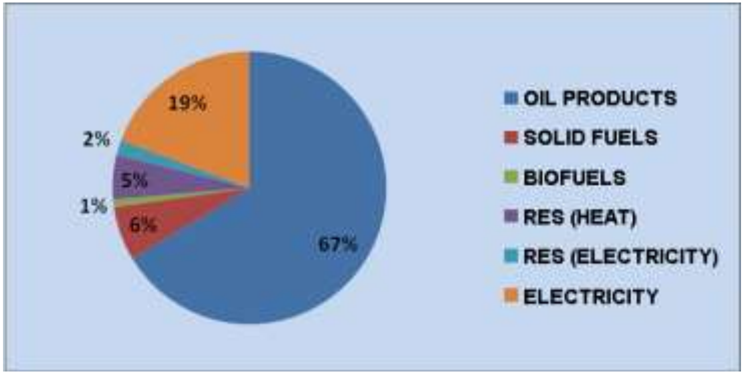


Figure 11: Energy mix - final energy consumption 2014.

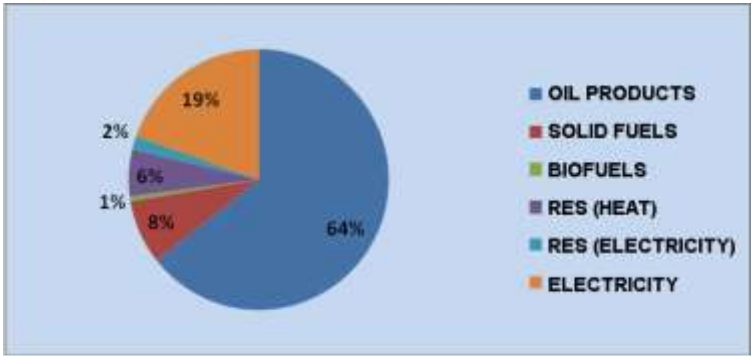
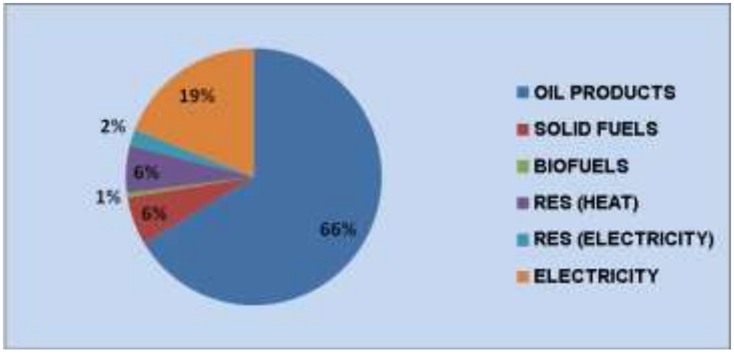


Figure 12: Energy mix - final energy consumption 2015.



14. As far as final energy consumption in the individual sectors is concerned, the transport sector still recorded the highest demand for energy in 2015, with 54 % (road transport:

70.5 %; air transport: 29.5 %). The shares of the residential, services and agricultural sectors were 32.7 % (2013), 32 % (2014) and 32.6 % (2015), respectively. Finally, the share of industry in the final energy consumption in 2013, 2014 and 2015 was 12.7 %, 14.8 % and 13.5 %, respectively.

Figure 13: Final energy consumption by sector (2013).

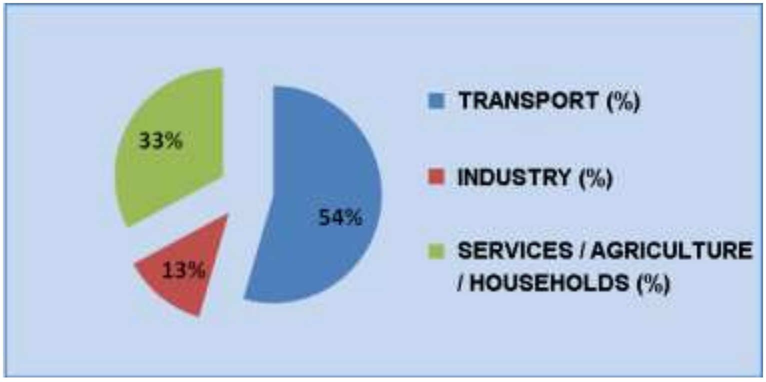


Figure 14: Final energy consumption by sector (2014).

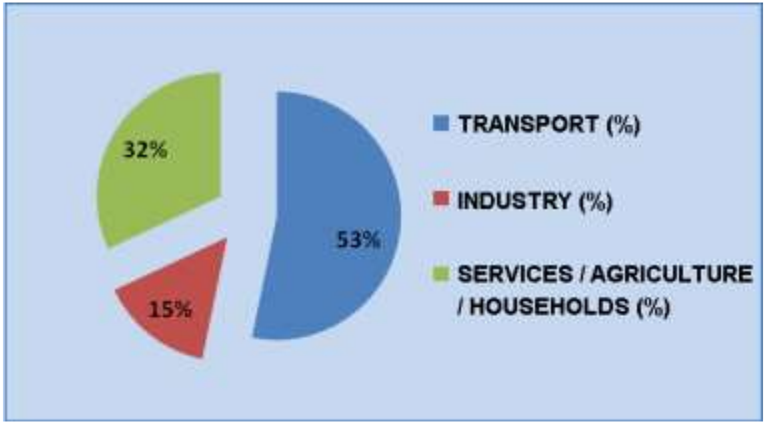
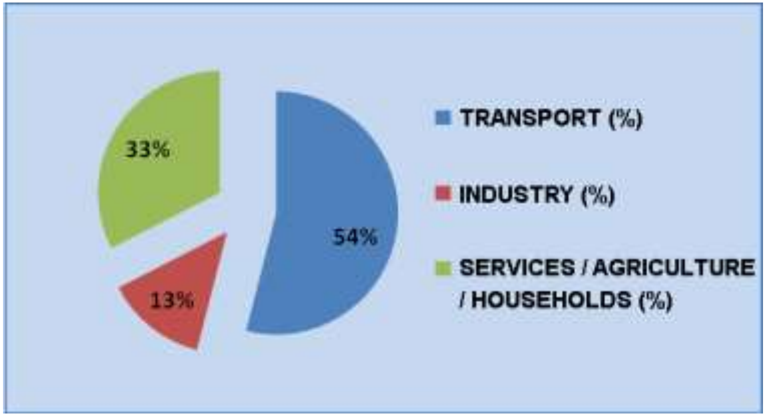


Figure 15: Final energy consumption by sector (2015).

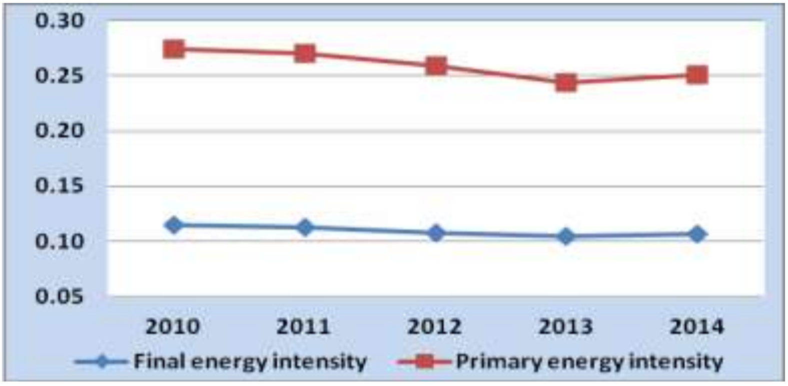


15. The domestic energy system experienced a steady drop in final energy intensity in recent years, up until 2013. There was a marginal increase in 2014. The energy intensity in the industrial sector is rather low compared to those of other Member

States, due to the nature of the industrial sector. However, energy efficiency in industry has improved significantly, as the branch of industry that is subject to the greenhouse gas emissions trading scheme (which consumes approximately 50 % of the total final energy consumed by the industrial sector) has implemented energy-saving measures and used combined heat and power technology in recent years.

16. The energy intensity of households is lower than the European average level, due to the country’s moderate climate. Increasing trends are observed, though, due to the rising standard of living and the increased electricity consumed by air conditioners. Following accession of Cyprus to the EU in 2004, measures and policies have been implemented towards improving the energy efficiency of buildings and domestic appliances.

Figure 16: Energy intensity 2010-2014 (ktoe/EUR 2005).



17. The energy intensity in the transport sector is among the highest in the EU, mainly due to the large percentage of road transport operations. However, there has been a remarkable improvement in this sector in recent years. The increase in the energy efficiency of private vehicles and the import of smaller and more efficient cars have led to better results although public transport in Cyprus is not adequately developed. The transport sector, along with the electricity generation and building sectors, is one of those sectors that offer a significant potential for energy efficiency improvement.

18. The potential for energy savings in the residential sector through the implementation of proper thermal insulation measures is significant, ranging between 25 % and 50 %, as the case may be. In addition to thermal insulation, another important field where energy can be saved in buildings is that of heating and cooling systems, regular

maintenance of which can ensure important energy and environmental benefits. Please note that the building sector in Cyprus consumes more than 35 % of the country's total need for energy.

19. Thanks to the application of mandatory thermal insulation regulations for new buildings in Cyprus, mostly in the last ten years, also including the obligation to obtain an energy performance certificate for existing buildings used for financial purposes (purchase, sale, renting, etc.), as well as the operation of the grant schemes of the Special Fund (2004-2013) and of the grant schemes of the 'Save & Upgrade' programme, with financing from the European Regional Development Funds (ERDF) and the Cohesion Fund (CF) for the 2014-2020 period, significant improvements were made in terms of the energy performance of the building stock. Implementing the Energy Performance of Buildings Directive and the EED is expected to make a significant contribution towards energy savings in the building sector.

20. Recognising the important role which local/regional authorities can play in reaching the Union's 2020 targets (20 % reduction of carbon dioxide emissions, 20 % share of renewable energy sources in the energy mix, 20 % reduction in the demand for energy through energy efficiency), the European Union has developed a series of initiatives (Covenant of Mayors, Pact of Islands, European Energy Award) with the participation of 17 municipalities and 7 Communities of Cyprus. In this context, these authorities are preparing Sustainable Energy Action Plans (SEAPs) and are implementing actions in order to increase energy efficiency and the use of RES both in municipalities and in the private sectors within a municipality and they also organise Energy Days.

21. Tables 1 and 2 include the municipalities and communities of Cyprus which participate in one of the available European Initiatives. As most local authorities' action plans are either in the early stage of implementation or, in some cases, have not yet started to be implemented, their contribution towards the achievement of national energy savings targets is rather limited. The SEAPs of the Cypriot local authorities are posted on the website of the Cyprus Energy Agency, as indicated in **Annex I**.

Table 1: List of Cypriot Municipalities participating in EU initiatives and having prepared Sustainable Energy Action Plans.

No	Municipality	Covenant of Mayors	Pact of Islands	European Energy Award
1	Strovolos	√	√	√
2	Larnaca	√	√	√
3	Lakatamia	√	√	X
4	Paralimni	√	√	X
5	Aradippou	X	√	X
6	Aglantzia	√	√	√
7	Aghios Athanasios	√	√	√
8	Latsia	√	√	√
9	Dali	X	√	X
10	Geri	X	√	X
11	Engomi	√	√	√
12	Poli Chrysochous	√	√	√
13	Lefkara	√	√	√
14	Deryneia	√	X	X
15	Nicosia	√	X	X
16	Geroskipou	√	X	X
17	Kato Polemidia	√	X	X

Table 2: List of Cypriot Communities participating in EU initiatives and having prepared Sustainable Energy Action Plans.

No	Community	Covenant of Mayors	Pact of Islands
1	Ergates	X	√
2	Psimolofou	X	√
3	Platres	√	X
4	Agros	√	X
5	Lythrodontas	√	X
6	Episkopi Limassol	√	X
7	Kyperounta	√	X

22. The main energy efficiency and RES actions included in the SEAPs involve inter alia:

- Energy savings interventions on public buildings.
- RES system installation and/or replacement.
- Interventions in street lighting systems.
- Energy savings through information campaigns.
- Energy savings in transport.

23. With regard to the public and broader public sector, the 1st Green Public Procurement Action Plan (GPP) was implemented in Cyprus in the 2007-2009 period. The Department of Environment of the Ministry of Agriculture, Natural Resources and Environment coordinates the implementation of the Action Plan. The public sector's purchasing potential and needs, along with the actual response capacity of the Cypriot market, were looked into in the context of the 1st GPP Action Plan. The Action Plan aimed primarily to have the effort made focused on relatively easy-to-implement measures, which would yield short- or mid-term financial benefits and would also support other efforts, targets and obligations assumed by Cyprus.

24. With due account taken of the knowledge and experiences acquired by implementing the 1st Action Plan for 2007-2009, the problems that arose, the information from various market surveys conducted, as well as information obtained by exchanging views with other contracting authorities, the Department of Environment revised the Action Plan. The revised Action Plan was in force from 2012 to 2014. The Action Plan is posted on the website of the Department of Environment. The URL is given in Annex I.

2. OVERVIEW OF NATIONAL TARGETS ON ENERGY AND OF THE ENERGY SAVINGS ACHIEVED

1. According to the 1st NEEAP submitted by Cyprus, the average final consumption in the 2001-2005 reporting period was calculated at 1 842 730 TOE. The final indicative target adopted for 2016 was 185 000 TOE, or 10 %[1] energy savings compared to consumption in the reporting period. The target was expressed in primary energy, i.e. electricity was converted into primary energy consumption using a coefficient of 3.1, as the average efficiency of the electricity generated in Cyprus during the period in question was approximately 32 %.

2. Electricity consumption values under energy efficiency improvement measures implemented up until 2016 were converted into TOE using the coefficient 1 kWh = 0.086 * 10-3 TOE and were then multiplied by a coefficient of 2.7 as, based on data provided by the Electricity Authority of Cyprus (EAC), that was the coefficient for 2015. This coefficient is expected to further improve after the introduction and use of natural gas for power generation after 2019, ranging between 2.22 to 2.03 in 2020. This change has not been taken into account in making calculations concerning final consumption energy savings and the measures to be affected. However, it was taken into account in drawing up scenarios for the determination of the national indicative target for primary energy savings for 2020.

3. Based on the end use energy savings target set out in the 1st NEEAP, Cyprus appears to have achieved its target for 2016, as energy savings through the measures implemented by 2016 amounted to 242 317 TOE, or approximately 131 % of the energy consumption in the reporting period.

4. Concerning the national indicative target for primary energy savings, by implementing additional measures other than those already implemented by 2010, this will amount to 375 000 TOE in 2020, as set out in Chapter 2.1. The energy savings achieved through the measures implemented in the 2010-2016 period, and in force in 2020, amount to **121 815** TOE, or approximately **32.5** % of the target.

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[1] Under Directive 2006/32/EC on energy end-use efficiency and energy services, the minimum target must be 9 %.

Following the implementation of the additional measures in the 2017-2020 period, the estimated energy savings for 2020 are expected to amount to **380 815** TOE, or approximately 101.6 % of the target.

5. End use and primary energy savings were calculated on the basis of the information provided by the agencies listed in **Annex K**. Please note that both end use and primary energy savings were calculated only with regard to the measures for which information was available. Other energy efficiency improvement measures were also implemented in Cyprus, but there was no available information in order to perform energy savings calculations as of the date of drafting hereof. Please note that some of these measures, which contribute towards the attainment of the 2020 target, may be included in the following NEEAP.

2.1 Overview of national energy efficiency targets for 2020

1. Primary energy consumption in Cyprus remained unchanged at 2.2 Mtoe from 2013 to 2015. Primary energy consumption in Cyprus is in line with the national indicative target for 2020 (the target for 2020 is 2.2 Mtoe, and primary energy consumption was 2.2 Mtoe in 2015, just like in the years 2014 and 2013). The energy intensity rate, i.e. the ratio of primary energy consumption to GDP, has also remained unchanged in recent years. This indicator reflects the energy efficiency of the national economy as a whole each year. The rate appears to be fixed at 128 ktoe/EUR million in 2014 and 2015.

2. In May 2017, Cyprus revised its national energy forecasts for the 2014-2020 period (**Annex H**), taking into account its new energy and economic data. A study was prepared for that revision, in cooperation with Dr Theodoros Zachariadis, assistant professor at the Cyprus University of Technology, using the 3EP model. In this context, there was a revision made of both the national reference scenario and the national energy efficiency scenario. Under the new model, the future annual energy consumption and energy prices are calculated for each significant sector of economic activity in Cyprus (agriculture, industry, households, services, transport) as a function of future macroeconomic variables. The model is also used to calculate the share of

fuels in each sector, taking into account the cost of the technologies used (investments, operation, maintenance and fuel cost), the penetration potential of different technologies and the technical restrictions for their use, also allowing calculations to be made of future trends with regard to final energy consumption per sector and per fuel. A description of the model along with important tables of the data used and the calculation results are also provided in **Annex H**.

3. As explained in the 3rd NEEAP submitted in 2014, both the macroeconomic environment and the regulatory framework for energy have changed in Cyprus. At a macroeconomic level, after the dramatic events of March 2013 and the need for budgetary adjustment as well as for downsizing and restructuring the domestic banking sector, to achieve sustainable mid-term public debt levels, an economic and budgetary adjustment programme was implemented in Cyprus, as agreed between the national authorities and the troika (Commission, ECB and IMF). The adjustment programme caused the national economy to shrink sharply in 2013 and 2014, primarily due to the significant drop in private and public spending and in investment, and then brought about a slow economic recovery from 2015 onwards. This macroeconomic prospect, which was incorporated in the 2014 NEEAP, proved to be quite optimistic, as the Cypriot economy experienced a recession that was slower than expected and a faster recovery. The current updated NEEAP has taken into account the revised economic prospects that will lead to higher growth rates in the future.

4. As shown in **Annex H**, the rates used in the new model (e.g. GDP, private consumption rate) conform to the Commission's macroeconomic forecasts. As regards the development of crude oil prices (also affecting the energy prospects of Cyprus), the model has used the latest oil price forecasts, as published by the International Energy Agency.

5. The new reference scenario has assumed the same trend in respect of energy intensity as that used in the reference scenario of the previous NEEAP and has adjusted the energy consumption developments up until 2020 based on the more recent actual energy consumption data and the latest economic growth forecasts up until 2020. This is a reasonable approach as the reference scenario is by definition one that cannot be

applied currently because it assumes that no new energy efficiency policies have been adopted after 2010. This approach ensures a substantive comparison between that scenario and the realistic energy efficiency scenario.

6. The realistic energy efficiency scenario relates to forecasts in each energy sector by taking additional measures to those in force up until 2010. It provides for adopting further energy efficiency measures after 2010, such as continued use of financing tools for investments in energy savings technologies, implementation of the EED, further promotion of measures for buildings and a shift to nearly-zero energy buildings later on during that decade. In particular, the implementation of Directive 2012/27/EU on energy efficiency will lead to the following measures by 2020:

    - Renovations and other energy efficiency improvement measures in buildings owned and used by the central government.
    - Implementing measures to attain the mandatory end use energy savings target by 2020, as set out in Article 7 of the Directive (inter alia, keeping the economic incentives for the renovation of dwellings and buildings owned and used by SMEs in force up until 2020).
    - Energy performance requirements for purchasing done by public bodies.
    - Energy efficiency measures for road lighting systems.
    - Mandatory energy audits for non-SMEs.
    - Energy efficiency information and training.

7. As regards the industry sector, the focus has been on enhancing the energy efficiency of industrial processes and equipment in Cyprus in recent years. The policies taken into account in the additional energy efficiency scenario in this sector includes the ones provided for in the EED (2012/27/EU), as well as training for energy auditors and energy managers. Provision has also been made for certain small-scale industrial investments in automation systems or replacement of electric motors or pressurised air systems with other more efficient ones.

8. As regards transport, the energy efficiency scenario assumes that the same trends will continue to exist both in respect of transport activities and the use of public transport. It is also forecast that the increase in the national tax imposed on vehicles based on carbon dioxide emissions in 2019 may somehow accelerate the use of new low carbon dioxide emissions vehicles.

9. The final demand for electricity under the 'energy efficiency scenario' is in line with the latest official electricity forecasts for the 2016-2025 period, as made by the Transmission System Operator (TSO) and approved by the Cyprus Energy Regulatory Authority in 2016.

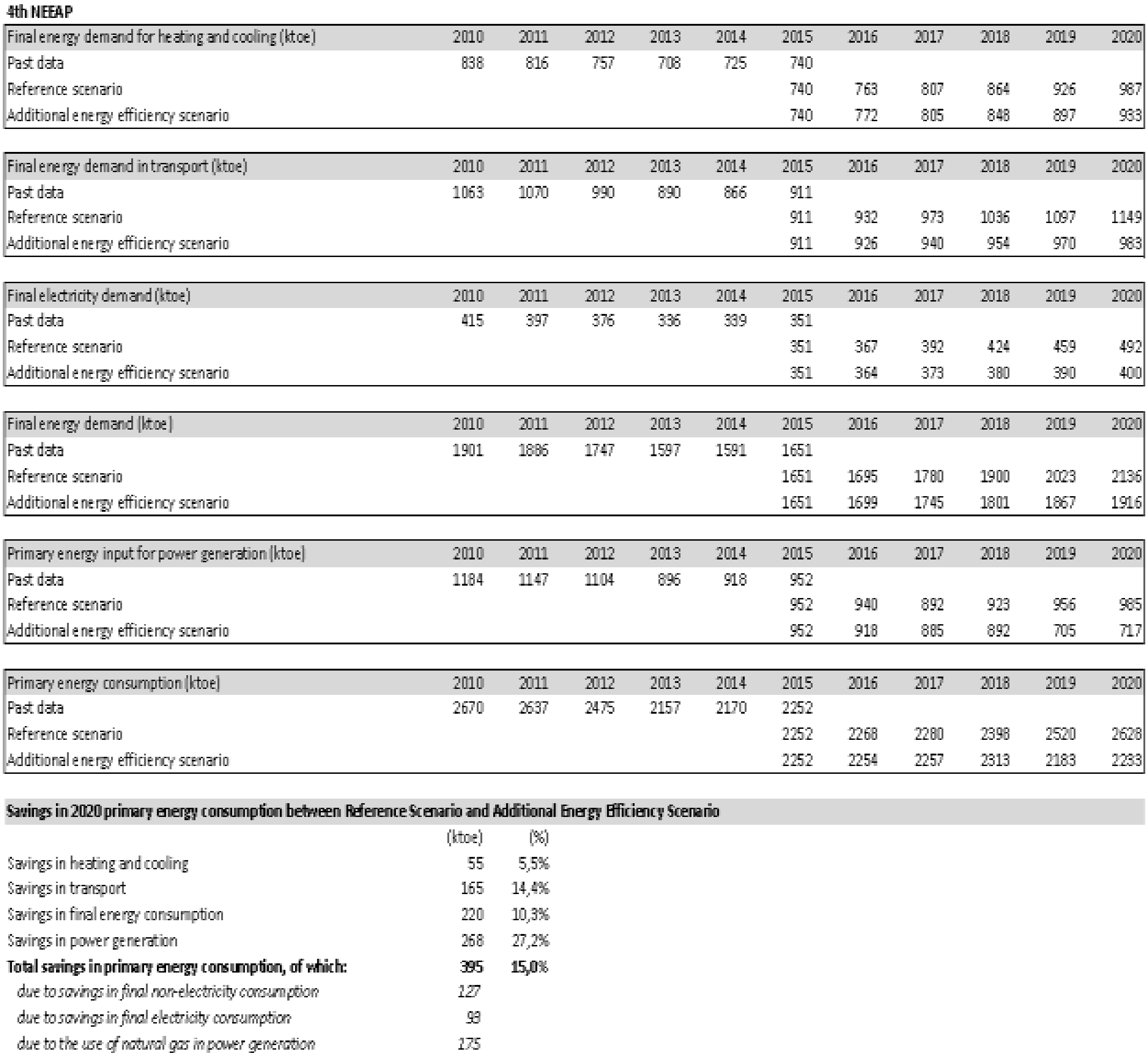
10. As regards the use of fuels for energy generation, the reference scenario assumes that natural gas will not have entered the power generation market by 2020, whereas the energy efficiency scenario assumes that it will enter the market in 2019, as forecast by the national authorities in early 2017.

Table 3: Forecast in the energy efficiency scenario.

Realistic Scenario (energy efficiency scenario)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Final energy consumption	1901	1886	1747	1597	1591	1651	1699	1745	1801	1867	1916
Final electricity consumption	415	397	376	336	339	351	364	373	380	390	400
Final non-electricity consumption, *of which:*	1486	1490	1371	1261	1252	1300	1335	1372	1421	1478	1516
Industry	176	140	112	129	163	142	151	157	170	189	204
Households	171	182	182	172	162	178	188	201	220	234	241
Services	50	73	57	45	38	38	40	42	47	53	56
Agriculture	26	24	29	25	23	30	31	31	31	31	31
Road Transport	785	766	718	646	627	648	648	650	652	654	653
Air Transport	279	304	272	243	239	263	278	290	302	317	330
Primary energy input for power generation	1184	1147	1104	896	918	952	918	885	892	705	717
Primary energy consumption	**2670**	**2637**	**2475**	**2157**	**2170**	**2252**	**2254**	**2257**	**2313**	**2183**	**2233**

Final energy demand by sector for Realistic Scenario (energy efficiency scenario)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
air transport	279	304	272	243	239	263	278	290	302	317	330
road transport	785	766	718	646	627	648	649	650	652	654	654
industry	249	209	167	180	220	201	211	219	234	256	274
households	321	330	326	296	284	308	322	337	354	369	378
services	229	240	222	195	185	188	196	206	216	227	235
agriculture	40	37	41	37	35	42	43	44	44	45	45
Total	**1901**	**1886**	**1747**	**1597**	**1591**	**1651**	**1699**	**1745**	**1801**	**1867**	**1916**
Final energy intensity (toe/MEuro'2005)	113	112	107	104	105	108	108	108	108	109	109

Table 4: National energy demand forecast for Cyprus under the two scenarios and energy savings allocation per sector.



4th NEEAP

Final energy demand for heating and cooling (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	838	816	757	708	725	740					
Reference scenario						740	763	807	864	926	987
Additional energy efficiency scenario						740	772	805	848	897	933

Final energy demand in transport (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1063	1070	990	890	866	911					
Reference scenario						911	932	973	1036	1097	1149
Additional energy efficiency scenario						911	926	940	954	970	983

Final electricity demand (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	415	397	376	336	339	351					
Reference scenario						351	367	392	424	459	492
Additional energy efficiency scenario						351	364	373	380	390	400

Final energy demand (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1901	1886	1747	1597	1591	1651					
Reference scenario						1651	1695	1780	1900	2023	2136
Additional energy efficiency scenario						1651	1699	1745	1801	1867	1916

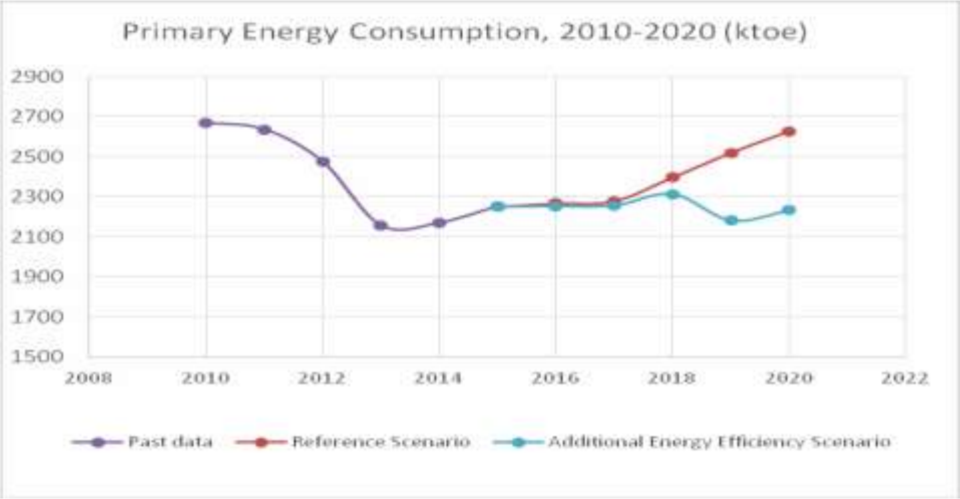
Primary energy input for power generation (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1184	1147	1104	896	918	952					
Reference scenario						952	940	892	923	956	985
Additional energy efficiency scenario						952	918	885	892	705	717

Primary energy consumption (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	2670	2637	2475	2157	2170	2252					
Reference scenario						2252	2268	2280	2398	2520	2628
Additional energy efficiency scenario						2252	2254	2257	2313	2183	2233

Savings in 2020 primary energy consumption between Reference Scenario and Additional Energy Efficiency Scenario

	(ktoe)	(%)
Savings in heating and cooling	55	5,5%
Savings in transport	165	14,4%
Savings in final energy consumption	220	10,3%
Savings in power generation	268	27,2%
Total savings in primary energy consumption, of which:	**395**	**15,0%**
due to savings in final non-electricity consumption	*127*	
due to savings in final electricity consumption	*93*	
due to the use of natural gas in power generation	*175*	

Figure 17: National energy consumption forecast for 2020.



11. By comparing the current forecasts against those included in the previous 3rd NEEAP (2014), one can see that primary energy consumption in 2020 will be almost the same as that of the 3rd NEEAP (2233 ktoe, compared to 2201 ktoe), as the expected increase in the demand for energy due to faster economic growth will be offset by the lower energy intensity in road transport and power generation.

12. It appears that the expected energy savings may be somewhat higher under the 4th NEEAP than that under the 3rd NEEAP primarily due to the fact that the improvement in power generation under the current reference scenario (which assumes that no natural gas will have been used by 2020) is not so high as that under the energy efficiency scenario. As a result, the difference between the primary energy inputs for power generation between the two scenarios is higher than before and gets even higher from 2019 onwards, when natural gas is expected to be used for the generation of a large part of the total electricity. Please also note that, just like under the additional energy efficiency scenario of the 3rd NEEAP, almost half of the total savings (127 + 93 = 220 ktoe, or 56 %) may represent end use energy savings and 44% (175 ktoe) may represent primary energy savings due to the use of natural gas in power generation.

13. In view of the above, the national indicative primary energy consumption target for 2020 is not essentially different from the current target, as it is still 2.2 Mtoe for 2020 (2233 ktoe under the current forecast compared to 2205 ktoe under the forecast made

in the 3rd NEEAP). As regards end use energy consumption, the forecast for 2020 is slightly increased, standing at 1.9 Mtoe (1916 ktoe under the current forecast, compared to 1782 ktoe under the forecast made in the 3rd NEEAP). If we estimate the difference between the two revised scenarios, it appears possible to achieve maximum energy savings of 15 % compared to the reference scenario, i.e. 395 ktoe, in 2020.

14. In view of the above, Cyprus has maintained the national indicative primary energy savings target for 2020 at 375 ktoe, along with a forecast that the total primary energy consumption in Cyprus will be 2.2 Mtoe in 2020.

15. The measures already taken and those to be taken with a view to attaining that target are presented in paragraph 2.3 below.

16. The table below contains forecasts on important energy indicators for 2020, where possible.

Table 5: Estimates on national energy production and consumption in 2020.

Energy consumption estimate for 2020	***ktoe units***
Total primary energy consumption in 2020	*2.233*
Electricity transformation inputs (power generation in thermal power stations)	*712*
Power generation outputs (power generation in thermal power stations)	*358*
CHP transformation inputs	*15*
CHP transformation outputs - thermal	*5.1*
CHP transformation outputs - electricity	*5*
Losses from energy distribution (all fuels)	*37*
Total final energy consumption	*1.916*
Final energy consumption - industry	*274*
Final energy consumption - transport	***983***
Final energy consumption - households	***378***
Final energy consumption - services	***235***
Final energy consumption - agriculture	*45*

2.2 Additional energy efficiency targets

1. There have been no significant additional national targets on energy efficiency to date, regarding the overall economy or specific sectors, except for those set out in the introduction to this Chapter.

2. Details and information on nearly zero-energy buildings are provided in the 2ND NATIONAL PLAN FOR INCREASING THE NUMBER OF NEARLY ZERO-ENERGY BUILDINGS (NZEBS) (**Annex C**). The national definition of NZEBs for Cyprus is given in Annex A to the 2nd National Plan.

2.3 Primary energy savings overview

1. This section provides an overview of energy savings in primary consumption achieved through the energy efficiency improvement measures implemented in the 2010-2016 period, which will be in force in 2020 and will, therefore, contribute towards the 2020 target. In addition, it provides an overview of the measures expected to be implemented in the 2017-2020 period along with the estimated energy savings for 2020.

2. Based on an assessment of the energy efficiency improvement measures implemented in the 2010-2016 period, the estimated energy savings in 2016 amount to 190 911 TOE. Furthermore, the contribution of these measures towards the 2020 target amounts to 121 815 TOE, or 32.5 % of the target. The table below shows the measures implemented in the 2010-2016 period and the corresponding energy savings for the years 2016 and 2020. **Annex G** lists these measures classified by sector (residential, tertiary, industry and transport). Please note that a detailed description of the measures and relevant tables with detailed information/data are attached hereto as **Annex D**. The energy savings calculation methodologies used are attached to **Annex E**.

Table 6: Primary energy savings achieved.

No	DESCRIPTION OF MEASURES[2]	IMPLEMEN-TATION PERIOD	PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET FOR 2020 (375 000 TOE)	
			TOE	TOE	%
1	**MINIMUM ENERGY PERFORMANCE REQUIREMENTS FOR NEW BUILDINGS (LAW 142/2006)**	**2010-2016**	**76 721.6**	**76 721.6**	**20.46 %**
1.1	RESIDENTIAL SECTOR		67 696.9	67 696.9	18.05 %
1.2	TERTIARY SECTOR		9 024.7	9 024.7	2.41 %
2	**RES PLANS**	**2010-2013**	**1 077.3**	**1 077.3**	**0.29 %**
2.1	RESIDENTIAL SECTOR		987.2	991.9	0.26 %
2.2	TERTIARY SECTOR - ENTERPRISES		84.5	84.7	0.02 %
2.3	INDUSTRY SECTOR		5.6	6.1	0.00 %
3	**ENERGY SAVINGS PLANS**	**2010-2013**	**2 413.8**	**2 413.8**	**0.64 %**
3.1	RESIDENTIAL SECTOR		1 093.9	1 093.9	0.29 %
3.2	TERTIARY SECTOR - PUBLIC SECTOR		0.00	0.00	0.00 %
3.3	TERTIARY SECTOR - ENTERPRISES		715.1	715.1	0.19 %
3.4	INDUSTRY SECTOR		604.9	604.9	0.16 %
4	**SCHEME FOR THE INSTALLATION OF PV SYSTEMS USING THE NET-METERING METHOD IN THE RESIDENTIAL SECTOR**	**2013-2016**	**10 495.4**	**10 495.4**	**2.80 %**
5	**INSTALLATION OF PV SYSTEMS FOR AUTOPRODUCTION BY BUSINESS CONSUMERS**	**2013-2015**	**717.2**	**717.2**	**0.19 %**
6	**GREEN PUBLIC PROCUREMENT**	**2010-2013**	**368.9**	**368.9**	**0.10 %**
7	**VEHICLE SCRAPPING SCHEME**	**2010**	**167**	**167**	**0.04 %**
8	**GRANT SCHEMES FOR VEHICLES**	**2010-2013**	**0.0**	**0**	**0.00 %**
9	**FLUORESCENT LAMPS CAMPAIGN**	**2010-2012**	**13 696.3**	**9 767.5**	**2.60 %**
10	**‘SAVE & UPGRADE’ GRANT SCHEME**	**2015-2016**	**7 580.1**	**7 580.1**	**2.02 %**
10.1	RESIDENTIAL SECTOR		2 824.1	2 824.1	0.75 %
10.1.1	RESIDENTIAL SECTOR - VULNERABLE CONSUMERS		33.1	33.1	0.01 %
10.2	TERTIARY SECTOR - ENTERPRISES		4 722.9	4 722.9	1.26 %
11	**SOLAR WATER HEATERS REPLACEMENT SCHEME**	**2015-2016**	**98.3**	**98.3**	**0.03 %**
12	**MEASURES TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 5 OF THE DIRECTIVE.**	**2014-2016**	**345.8**	**132.81**	**0.04 %**
12.1	ENERGY SAVINGS FROM MAJOR RENOVATIONS AND INDIVIDUAL ENERGY SAVINGS MEASURES IN THE PUBLIC SECTOR.		132.8	132.8	0.04 %
12.2	ENERGY SAVINGS FROM MEASURES INTENDED TO IMPROVE USER CONDUCT TOWARDS A MORE RATIONAL USE OF ENERGY IN PUBLIC BUILDINGS.		213.0	0.00	0.00 %
13	**HORIZONTAL MEASURES (INFORMATION CAMPAINGS, WORKSHOPS, ETC.) TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 7 OF THE DIRECTIVE.**	**2014-2015**	**668.2**	**0.00**	**0.00 %**
14	**REPLACEMENT OF ENERGY-RELATED PRODUCTS (DIRECTIVE 2010/30/EC ON THE INDICATION BY LABELLING AND STANDARD PRODUCT INFORMATION OF ENERGY AND OTHER RESOURCES BY ENERGY-RELATED PRODUCTS).**	**2010-2016**	**12 802.3**	**12 275.2**	**3.27 %**
15	**ACTION PLAN IN TRANSPORT**	**2010-2016**	**63 759.2[3]**	**-**	**-**
TOTAL			**190 911.6**	**121 815.3**	**32.48 %**

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[2] A detailed description of the measures is provided in Annex D (Measures already implemented).

[3] Please note that savings of 63 926 TOE have been calculated for 2016 in transport. The amounts relating to points 7 and 8 of the above table have been deducted to avoid including the savings twice. Moreover, no energy savings were calculated for 2020 as the top-down methodology was used to calculate energy savings and no savings could be calculated for 2020.

3. The table below shows measures expected to be implemented in the 2017-2020 period.

Table 7: Estimated primary energy savings from the implementation of measures to be implemented by 2020.

No	Measures expected/planned to be implemented by 2020	Energy savings (TOE)	Contribution towards target attainment (%) 375 000 TOE
1	**ENERGY SAVINGS DUE TO USE OF NATURAL GAS IN POWER GENERATION FROM 2019 ONWARDS.**	175 000	46.67 %
2	**ENERGY SAVINGS DUE TO ENERGY SAVINGS MEASURES IN TRANSPORT.**	40 000	10.67 %
3	**CONTRIBUTION OF THE ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE.**	20 000	5.33 %
4	**ENERGY SAVINGS DUE TO CONTINUED IMPLEMENTATION OF MEASURES UNDER APPLICATION OF ARTICLE 7 EED.**	20 000	5.33 %
5	**REPLACEMENT OF ENERGY-RELATED PRODUCTS (DIRECTIVE 2010/30/EC ON THE INDICATION BY LABELLING AND STANDARD PRODUCT INFORMATION OF ENERGY AND OTHER RESOURCES BY ENERGY-RELATED PRODUCTS).**	3 000	0.80 %
6	**MEASURES TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 5 EED.**	1 000	0.27 %
7	**CONTRIBUTION OF MEASURES IMPLEMENTED IN THE 2010-2016 PERIOD, WHICH ARE STILL IN FORCE IN 2020**	121 815.31	32.48 %
TOTAL		**380 815.3**	**101.55 %**

4. It is therefore estimated that the primary energy savings in 2020 owing to the measures implemented in the 2010-2016 period and those to be implemented in the 2017-2020 period will amount to 380 815 TOE, or 101.6 % of the target.

2.4 Final energy savings overview

1. This section provides an overview of energy savings in primary consumption achieved through the energy efficiency improvement measures implemented in the 2004-2016 period, which will be in force in 2016 and will, therefore, contribute towards the 2016 target. As referred to above for the purposes of Directive 2006/32/EC, the end use target set for Cyprus is expressed in primary energy. Based on an assessment of the energy efficiency improvement measures implemented in the 2004-2016 period, the end use target of 185 000 TOE for 2016 is achieved as the estimated energy savings amount to 242 317 TOE, or ή 130 % of the target. The table below lists the measures implemented in the 2004-2016 period and the corresponding amount of energy

savings for 2016. **Annex G** provides lists of these measures classified by sector (residential, tertiary, industry and transport)

Table 8: End-use energy savings achieved per set of measures towards the 2016 target.

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	CONTRIBUTION TOWARDS THE FINAL INDICATIVE END USE TARGET (2016, 185.000 TOE)	
			TOE	%
1	**MINIMUM ENERGY PERFORMANCE REQUIREMENTS FOR NEW BUILDINGS (LAW 142/2006)**	**2008-2016**	**108 427.5**	**58.61 %**
1.1	RESIDENTIAL SECTOR		97 275.2	52.58 %
1.2	TERTIARY SECTOR		11 152.3	6.03 %
2	**RES PLANS**	**2004-2013**	**13 896.9**	**6.88 %**
2.1	RESIDENTIAL SECTOR		12 734.4	6.88 %
2.2	TERTIARY SECTOR - ENTERPRISES		1 133.4	0.61%
2.3	INDUSTRY SECTOR		29.1	0.02 %
3	**ENERGY SAVINGS PLANS**	**2004-2013**	**22 075.2**	**11.93 %**
3.1	RESIDENTIAL SECTOR		10 526.7	5.69 %
3.2	TERTIARY SECTOR - PUBLIC SECTOR		96.6	0.05 %
3.3	TERTIARY SECTOR - ENTERPRISES		9 042.5	4.89 %
3.4	INDUSTRY SECTOR		2 409.8	1.30 %
4	**SCHEME FOR THE INSTALLATION OF PV SYSTEMS USING THE NET-METERING METHOD IN THE RESIDENTIAL SECTOR**	**2013-2016**	**10 495.4**	**5.67 %**
5	**INSTALLATION OF PV SYSTEMS FOR AUTOPRODUCTION BY BUSINESS CONSUMERS**	**2013-2015**	**717.2**	**0.39 %**
6	**GREEN PUBLIC PROCUREMENT**	**2007-2013**	**515.6**	**0.28 %**
7	**VEHICLE SCRAPPING SCHEME**	**2008-2010**	**2 822.8**	**1.53 %**
8	**GRANT SCHEMES FOR VEHICLES**	**2004-2009**	**1 073.5**	**0.58 %**
9	**FLUORESCENT LAMPS CAMPAIGN**	**2007-2012**	**13 696.3**	**7.40 %**
10	**'SAVE & UPGRADE' GRANT SCHEME**	**2015-2016**	**7 580.1**	**4.10 %**
10.1	RESIDENTIAL SECTOR		2 824.1	1.53 %
10.1.1	RESIDENTIAL SECTOR - VULNERABLE CONSUMERS		33.1	0.02 %
10.2	TERTIARY SECTOR - ENTERPRISES		4 722.9	2.55 %
11	**SOLAR WATER HEATERS REPLACEMENT SCHEME**	**2015-2016**	**98.3**	**0.05 %**
12	**MEASURES TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 5 OF THE DIRECTIVE.**	**2014-2016**	**345.8**	**0.19 %**
12.1	ENERGY SAVINGS FROM MAJOR RENOVATIONS AND INDIVIDUAL ENERGY SAVINGS MEASURES IN THE PUBLIC SECTOR.		132.8	0.07 %
12.2	ENERGY SAVINGS FROM MEASURES INTENDED TO IMPROVE USER CONDUCT TOWARDS A MORE RATIONAL USE OF ENERGY IN PUBLIC BUILDINGS.		13.0	0.12 %
13	**HORIZONTAL MEASURES (INFORMATION CAMPAINGS, WORKSHOPS, ETC.) TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 7 OF THE DIRECTIVE.**	**2014-2015**	**668.2**	**0.36 %**
14	**REPLACEMENT OF ENERGY-RELATED PRODUCTS (DIRECTIVE 2010/30/EC ON THE INDICATION BY LABELLING AND STANDARD PRODUCT INFORMATION OF ENERGY AND OTHER RESOURCES BY ENERGY-RELATED PRODUCTS).**	**2010-2016**	**12 802.3**	**6.92 %**
15	**ACTION PLAN IN TRANSPORT**	**2007-2016**[4]	**45 266.1**	**24.47 %**
TOTAL			**240 481.2**	**129.99 %**

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[4] Please note that savings of 49 162 TOE have been calculated for 2016 in transport. The amounts relating to points 7 and 8 of the above table have been deducted to avoid including the savings twice.

2. The highest contribution towards this target is made by EPBD, as energy savings of 108 428 TOE, or 58.61 % of the target, are achieved by implementing the measure. This if followed by energy savings in transport, energy savings and RES grant schemes, the campaign for distributing free lamps, etc.

3. Please note that a detailed description of the measures and relevant tables with detailed data/information are included in **Annex D,** whereas the methodologies used are the ones implemented under the 2nd and 3rd NEEAP and described in **Annex E**.

3. POLICY MEASURES IN IMPLEMENTATION OF THE ENERGY EFFICIENCY DIRECTIVE (EED)

3.1 Horizontal measures

3.1.1 Energy efficiency obligation schemes and alternative policy measures (Article 7)

1. In application of the provisions of Article 7(9) of the Directive, as an alternative to the adoption of an energy efficiency obligation scheme, Cyprus has prepared a National Energy Efficiency Programme (NEEP) for the purpose of achieving the mandatory cumulative energy savings target referred to in Article 7(1). The NEEP was notified to the Commission in December 2013. A revised NEEP was submitted to the Commission in July 2014.

2. The National Energy Efficiency Programme was prepared taking into account the provisions of Article 7 of Directive 2012/27/EU, Annex V to the Directive and the support document issued by the Commission entitled 'Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC - Article 7: Energy efficiency obligation schemes' on 6 November 2013.

3. The mandatory cumulative target calculated according to the provisions of the Directive amounts to 241 588 TOE and it must be achieved in the 2014-2020 period by taking measures to improve end-use energy efficiency. **Annex K** contains information on how to calculate the target, as well as a list of the measures included in the NEEP (July 2014) aimed at achieving the target.

4. The NEEP was revised during the drafting of the 4th NEEAP, as the measures included in 2014 failed to attain the target for the 2014-2020 period. That is why the information contained in the 4th NEEAP is limited. Upon submission of the revised NEEP to the Commission, the revised programme will be posted on the MECIT website. Please note that the 1st version of the NEEP (2013) is posted on the relevant website of the Commission at the URL provided in **Annex I**.

5. The table below contains summary information on the contribution from the measures included in the NEEP (2014), as implemented by the end of 2015. A contribution of 33 255 TOE was made by these measures, representing 13.8 % of the cumulative target for the 2014-2020 period.

Table 9: Energy savings achieved towards the target referred to in Article 7.

<table>
<tr><td colspan="3">National Energy Efficiency Programme (NEEP) - mandatory cumulative energy savings target for Cyprus for the 2014-2020 period in compliance with Article 7 of Directive 2012/27/EU on energy efficiency.</td><td>241 588</td><td>TOE</td></tr>
<tr><td>No</td><td>Description of measures</td><td>CUMULATIVE ENERGY SAVINGS FOR 2015 (TOE)</td><td>CUMULATIVE ENERGY SAVINGS FOR 2020 (TOE)</td><td>% OF THE TARGET</td></tr>
<tr><td>1</td><td>Energy efficiency and RES investments in public buildings (individual measures in the public sector, replacement of air conditioners, replacement of VRV systems and chillers, installation of new air conditioners).</td><td>194.96</td><td>811.15</td><td>0.34 %</td></tr>
<tr><td>2</td><td>Energy efficiency and RES promotion scheme for dwellings ('Save & Upgrade' scheme for dwellings).</td><td>281.99</td><td>7 331.80</td><td>3.03 %</td></tr>
<tr><td>3</td><td>Energy efficiency and RES promotion scheme for enterprises ('Save & Upgrade' scheme for enterprises).</td><td>118.23</td><td>3 073.90</td><td>1.27 %</td></tr>
<tr><td>4</td><td>Installation of photovoltaic systems for autoproduction by business consumers and photovoltaic systems using the net metering method in the residential sector</td><td>5 389.6</td><td>21 542.94</td><td>8.92 %</td></tr>
<tr><td>5</td><td>Horizontal measures (information campaigns, training programmes, workshops, etc.)</td><td>495</td><td>495</td><td>0.20</td></tr>
<tr><td colspan="2">TOTAL</td><td>6 479.7</td><td>33 254.8</td><td>13.77 %</td></tr>
</table>

Please note that the expected energy savings from continued implementation of these measures was not taken into account in estimating the contribution for 2020.

6. Finally, it should be stressed in advance that, apart from the above measures that are implemented, the revised NEEP is expected to include the following measures too.

- **Energy efficiency obligation scheme for obligated parties in the 2017-2020 period.** The scheme is currently being prepared and is expected to be ready in the following months. For the time being, only the Electricity Authority of Cyprus will be included in the scheme.

- **Increase in the RES fee applied on electricity**. This measure consists in increasing the RES and ES fee applied on electricity, which has been in force since 1 January 2017.

- **Excise duty on vehicles with a view to reducing CO2 emissions.** This measure relates to the tax imposed on vehicles with a view to reducing CO2 emissions, which has been in force since 2014.

- **Thermal insulation of dwellings through low-interest loans.** This measure relates to the new special product 'Thermal insulation financing', as developed by the Cyprus Cooperative Central Bank in cooperation with OEB and with support from the Energy Service, and will enable interested people to apply thermal insulation on the roof of their dwellings through a low-interest loan.

- **Replacement of road light lamps.** The 5th measure consists in replacing existing lamps / lighting fixtures in road lighting systems with new, more efficient ones.

- **Horizontal measures: Information campaigns on saving energy.** The measure consists in implementing horizontal measures (information campaigns) by MECIT focusing on specific target groups among the general population and has been in force since 2015.

- **Grant schemes for implementing individual measures in the residential, tertiary and industry sectors.** The grant schemes to be issued by the Special RES and ES Fund are expected to be launched in 2018, with a total budget of EUR 3 000 000.

- Voluntary agreements between MECIT and distributors and sellers of fuels intended for vehicles and heating systems. This measure consists in energy efficiency measures (e.g. fuel additives, information campaigns) being implemented by distributors and sellers of fuels intended for vehicles and heating systems through voluntary agreements to be entered into with MECIT.

- **Applying a lower VAT rate for the renovation and repair of private dwellings**. This measure, as planned by the Ministry of Finance, has been in force since December 2015 and relates to applying a lower VAT rate (5 %), instead of 19 %, for renovation and repair works carried out in existing private dwellings. The lower rate is used, inter alia, for works consisting in applying thermal insulation on the external envelope and replacing external door and window frames.

3.1.2 Energy audits and management systems (Article 8)

1. With a view to transposing the ESD (Directive 2006/32/EC), Cyprus adopted the End Use Energy Efficiency and Energy Services (Energy Auditors) Regulations of 2012 (RAA 184/2012) on 25 May 2012. These Regulations cover, inter alia, matters relating to the setup of a register of energy auditors in Cyprus, the procedure used for natural and legal persons to enrol in the register, the training of would-be energy auditors, the available categories of energy auditors, the required qualifications for persons to enrol in the register, the procedure for the control and quality assessment of energy auditors by the competent authority (Energy Service), the procedure for enrolment in the register of community energy auditors, the independence of energy auditors, the duties and obligations of energy auditors, etc. **Annex I** indicates the URL where the decree concerned is posted.

2. The first training programmes intended for would-be energy auditors were conducted by training organisations approved by the competent authority in 2013, and 64 energy auditors have already enrolled in the register of energy auditors. The register is posted on the MECIT website and is available to end consumers. **Annex I** indicates the URL where the register concerned is posted.

3. As regards the minimum requirements to be met in carrying out energy audits, the Methodology and Other Requirements for Conducting Energy Audits Decree of 2012 (RAA 171/2012) was adopted, which was replaced by Article 8 of the law amending the End Use Energy Efficiency and Energy Services Laws of 2009 and 2015 (Law (I)149/2015), which stipulates that the energy audits should meet the requirements laid down in Annex VI to the EED. The following legislation was also adopted: (a) the Methodology and Other Requirements for Conducting Energy Audits Decree of 2015 (RAA 437/2015), which provided that energy auditors should carry out energy audits in compliance with the standards CYS EN 16247 – 1:2012

(General Requirements), CYS EN 16247 – 2:2014 (Energy Audits part-2: Buildings) and CYS EN 16247 – 3:2014 (Energy Audits part-3: Processes), and (b) the Methodology and Other Requirements for Conducting Energy Audits Decree of 2015 (RAA 436/2015), which included a 'Technical Guide' setting out the requirements and technical standards to be complied with by energy auditors in carrying out energy audits in the transport sector. These decrees are posted on the MECIT website.

4. The EED requires Member States to promote high quality, effective and independent energy audits. It also requires large enterprises to carry out energy audits at least every four years. There is a total of 65 energy audits for which there is available information, as carried out in the period covered by the 4th NEEAP, 10 of which are energy audits carried out on non-SMEs.

5. All the provisions of Article 8 EED have been included in the following laws:

    - **Law 31(I)/2009 and Law 52(I)/2012:**the End Use Energy Efficiency and Energy Services Laws of 2009 and 2012 (transposing Directive 2006/32/EC);
    - **Law 53(I)/2012:** the End Use Energy Efficiency and Energy Services (Amending) Law (amending Articles 2, 5, 8 and 9 of the basic Law);
    - **Law 56(I)/2014:** the End Use Energy Efficiency and Energy Services (Amending) Law (amending Articles 2, 6, 9, 10 and 11 of, and the Annex to, the basic Law);
    - **Law 149(I)/2015:** the End Use Energy Efficiency and Energy Services (Amending) Law (amending Articles 2, 3, 4, 5, 8, 9, 11, 13, 14, 15, 16, 17, 18 and 19 of, and Annexes II, III, IV and V to, the basic Law);

    or in the following regulations adopted on the basis of the above laws:

    - **RAA 184/2012:** the End Use Energy Efficiency and Energy Services (Energy Auditors) Regulations of 2012 (regulating matters relating to the training and licensing of energy auditors for buildings, industries and transport);

- **RAA 210/2014:** the End Use Energy Efficiency and Energy Services (Energy Service Providers) Regulations (regulating matters relating to the licensing of energy service providers and specifying the minimum issues to be regulated through energy efficiency contracting);

- **RAA 437/2015:**the Methodology and Other Requirements for Conducting Energy Audits Decree of 2015 (specifying the application of the standards CYS EN 16247 parts 1, 2 & 3 in carrying out energy audits in buildings and industries);

- **RAA 436/2015:** the Methodology and Other Requirements for Conducting Energy Audits (Transport) Decree of 2015 (laying down a 'Technical Guide' setting out the requirements and technical standards to be complied with by energy auditors in carrying out energy audits in the transport sector;

- **RAA 435/2015:** the Energy Auditors Services Decree of 2015 (authorising the Energy Service officers to act as inspectors for implementing the Law).

Please note that the Energy Service of MECIT is the competent authority for implementing and supervising the above legislation.

6. In accordance with Article 5(6)(c) of the Law, any enterprises not falling within the definition of small and medium-size enterprises (SMEs), which apply an energy or environmental management system that is certified by an independent organisation in accordance with the relevant European and international standards, may be exempted from the requirements of paragraph 6(a), as the system applied requires that energy audits be carried out by energy auditors who are duly licensed by the competent authority.

7. In accordance with rule 20(1) and (2) of RAA 184/2012, the energy auditors and the quality assessment of energy audits should be monitored and controlled by the competent authority. To that end, energy auditors should submit, upon request, to the competent authority any information, measurements, reports and all other data that

are necessary for the assessment. Controls are carried out on a sampling basis, either on the authorities' own initiative or following a complaint.

8. Please note that, in accordance with the same Regulation, energy auditors must, inter alia, draw up a results report and keep in file the reports and measurements for the energy audits they have carried out in the last ten years. They must also submit to the competent authority, within 30 days of the end of the calendar year, an annual list of the energy audits they carried out in the previous year, including those based on voluntary agreements. Therefore, the competent authority may, at any time, verify whether the energy audits are carried out in compliance with the minimum criteria laid down in the national legislation, as well as in Annex VI to EED. The above quality assessment procedure also covers in-house experts who may carry out energy audits on the organisations employing them, as they, too, must be duly licensed and enrolled in the register of energy auditors.

9. Details on the training programmes available for qualifying as energy auditors are posted on the website of MECIT and of the training organisations approved by the competent authority. It should also be stressed that the licensing of energy auditors and the training programmes are also monitored by the Energy Auditors Committee, as set up to assist the competent authority with monitoring matters relating to energy auditors.

10. To date, Cyprus has not cooperated with other Member States for the recognition of qualifications or equivalent schemes. Matters related to the recognition of qualifications or equivalent schemes for energy auditors licensed in other Member States are regulated by RAA 184/2012.

11. To encourage SMEs (small and medium-sized enterprises) to undergo energy audits and implement recommendations, new grant schemes for promoting the implementation of energy saving investments in buildings, industries and households were planned and launched in 2015 and 2016 and are expected to be re-launched in 2018. The provisions of the scheme included, inter alia, subsidising the energy audit

and the implementation of the recommendations contained in the energy audit report. Moreover, the Energy Service has informed both the representatives of SMEs and households of the benefits of energy auditing, in the context of daily workshops, reports and meetings, through information leaflets issued and distributed for this purpose, as well as through its official website. The Energy Service intends to launch additional actions for this purpose in 2018.

12. The Energy Service participates in events for the exchange of best practices on energy management systems in SMEs. For this purpose, the Cyprus Organisation for Standardisation and the Cyprus Employers and Industrialist Federation (OEB), in cooperation with the Energy Service, organises information events in order to inform all enterprises of the benefits ensured by implementing energy management systems that involve the exchange of best practices. The Energy Service intends to launch additional actions for this purpose in 2018.

3.1.3 Metering and billing (Articles 9-11)

1. The draft of the End Use Energy Efficiency and Energy Services (Amending) Law of 2014 contains provisions regulating the following matters inter alia:

   - Providing end users of district heating, district cooling and hot water for domestic use with individual meters indicating the actual consumption and time of use, unless this is not technically feasible and cost-efficient. This will occur upon replacement of the existing meter (unless this is not technically feasible and cost-efficient in relation to the energy savings potential) and upon connection of a new building or a building undergoing major renovation.

   - In multi-apartment and multi-purpose buildings with a central heating/cooling source, a consumption meter should be installed at the distribution point, as well as with individual meters (if this is not technically feasible and cost-efficient, alternative solutions must be sought).

   - The allocation of billing costs for individual heating and cooling in multi-apartment buildings will be free of charge. If this task is outsourced to third parties (that will undertake the metering, allocation and calculation of actual individual consumption), this cost may be transferred to end users, provided that it is reasonable.

2. As regards the results of the study referred to in Article 9(3) and the installation of individual consumption meters in building units that include multi-apartment and/or multi-purpose buildings with a central heating/cooling source, the study showed that it was not cost-efficient to install individual meters and individual distributors. Therefore, it was decided to exempt these buildings.

3. It should be stressed that the provisions of the Directive concerning the new arrangements for the metering and billing of electricity and natural gas fall within the competence of the CERA and are not included in the above draft law.

4. By the date of completion of the 4th NEEAP, no information was available from CERA on Articles 9, 10 and 11 on the metering and billing of electricity and natural gas.

3.1.4 Consumer information programmes and training (Articles 12 and 17)

1. The Ministry of Energy, Commerce, Industry and Tourism, the Energy Service in Particular, places particular emphasis on providing people with information on energy issues, with a view to increasing awareness among citizens and among different professionals. For this purpose, the Energy Service has, in cooperation with other bodies,[5] organised:

   (i) Cooperation with the Austrian Energy Agency, to obtain technical assistance for conducting an energy awareness campaign intended for the general public.

   (ii) An annual Pupil’s Competition. The competition has been conducted annually since the 2011-2012 school year. As of the 2014-2015 school year, the right to participate in the pupil’s competition is available for all public and authorised private elementary, secondary and technical schools. As regards elementary schools, the competition includes drawing paintings concerning RES and ES. As

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[5] These bodies include, for example, the Cyprus Energy Agency, the Technical Chamber of Cyprus (ETEK), municipalities and communities, business associations and the Cyprus Productivity Centre.

regards secondary and technical schools, it includes research projects carried out by pupils and/or experimental/laboratory applications that are directly associated with RES or ES. The works submitted by junior high schools and senior high / technical schools are evaluated jointly. Prizes, in the form of monetary awards, are awarded for the three best works (submitted by elementary and secondary/technical schools) at the end of the school year, in the context of an official ceremony. Also, the painting to which the 1st prize is awarded is printed in 1 000 copies and distributed in all elementary schools.

(iii) In the context of the project 'Sustainable Energy Development at Regional, Interregional and Cross-border Level' with the acronym 'ENERGEIN', under the EU 2007-2013 Greece-Cyprus cross-border cooperation programme, energy upgrading works were carried out in four public buildings in Nicosia, in the 2014-2015 period, with a total budget of EUR 1 340 000.00, in cooperation with the Department of Electrical and Mechanical Services of the Public Works Department of the Ministry of Transport, Communications and Works. The upgraded buildings are:

(a) the House of Representatives

(b) the Trade Service (Ministry of Energy, Commerce, Industry and Tourism)

(c) the Legislation Building of the Department of Electrical and Mechanical Services

(d) the Ministry of Labour, Welfare and Social Insurance

Public information events were also organised as part of the implementation of the project and relevant information material was distributed (USB flash drives, pens, leaflets, etc.). A video was also prepared and posted on the website of the Energy Service concerning the development and implementation of the project, which was shown in various events. The video has been posted on the YouTube channel of the Energy Service.

(iv) Talks on ES and RES subjects were given at schools of all levels (pre-elementary, elementary and secondary/technical education).

(v) The ES officer arrangement has been in place since 2011. It aims to appoint at least one ES officer in each building used (owned or rented) by public or broader public sector bodies. ES officers are primarily responsible for ensuring the implementation of zero-cost ES measures in the building. Among other things, ES officers prepare an annual report on the energy consumption of the building for which they are responsible and the actions carried out thereat. Energy Service officers organise training daily workshops on an annual basis, to provide ES officers with training.

(vi) Energy Service officers carry out, upon invitation from ES officers, inspections on buildings in the public and broader public sector, to give energy savings advice to the staff. In addition to the inspection carried out on the building, they may also give a talk on ES and RES if necessary.

(vii) Preparation and publication of information leaflets including inter alia, the following:

(a) ‘Guide on fuel economy and the reduction of carbon dioxide emissions in passenger vehicles’.

(b) ‘Zero-cost measures for energy savings at the workplace and at home’.

(c) ‘Eco-Design Leaflet’.

(d) ‘Technical guide on nearly zero-energy buildings’.

(e) ‘Cogeneration of heat and power’.

(f) ‘End use energy efficiency and energy services’.

(g)‘Energy savings guide’.

(h) ‘Energy star labelling guide’.

(i) ‘Energy auditors - energy audits’.

(j) ‘Renewable energy sources in simple words’.

(k) ‘Energy applications laboratory (Solar Collector and System Tests)’.

(l) ‘Photovoltaic systems using the net metering method’.

(m)‘Labelling of tyres with respect to fuel efficiency and other essential parameters’.

(n)‘Twelve rules for pupils’.

(o) ‘Energy service providers - energy efficiency contracting’.

(viii) Organisation of daily workshops intended primarily for members of the Technical Chamber of Cyprus (ETEK), of the Cyprus Employers and Industrialist Federation (OEB) and of the Cyprus Chamber of Commerce and Industry (KEBE), hotel operators, businessmen, financial institutions, municipalities, communities, contractors, as well as the general public. The themes of the workshops included primarily promoting the grant scheme ‘Save & Upgrade’ in dwellings and enterprises, ES and RES technologies used for heating and/or cooling, energy audits, energy efficiency of buildings, energy labelling, etc.

(ix) Organisation of daily workshops and events by OEB (with support from the Energy Service), aiming to strengthen the market in energy services and covering other issues relating to the provision of information and the implementation of Directive 2012/27/EU.

(x) Organisation of a daily workshop by the Cyprus Energy Agency, with support from the Energy Service, entitled ‘Financing methods for energy service providers concerning projects implemented through energy efficiency contracting’.

(xi) Participation of Energy Service officers in the annual ‘Save Energy’ exhibition organised by OEB in cooperation with the Energy Service and EAC. The RES and

ES Fund was one of the sponsors of the exhibition. Printed material was distributed at the exhibition concerning ES and RES technologies. Information is also provided to the general public on the provisions of the grant schemes.

(xii) The Energy Service has prepared five (5) radio spots, which were broadcast on Cypriot nationwide radio stations. The spots covered the following topics:

- (a) Energy performance certificates.
- (b) Inspections of air conditioning and heating. systems.
- (c) Simple ES measures.
- (d) Energy audits - energy service providers.
- (e) Energy labelling.

(xiii) The bills issued by EAC encourage people to save energy. Electricity statistics are also sent.

(xiv) Information on energy savings is also provided on the websites of organisations focusing on energy (e.g. Energy Service, Cyprus Energy Agency, Electricity Authority of Cyprus, Cyprus Transmission System Operator, etc.).

(xv) Information daily workshops are organised by the Cyprus Organisation for Standardisation on applying the ISO 50001 standard.

(xvi) Training programmes and certification examinations were held by the Cyprus Productivity Centre for energy-related professions and regarding the implementation of the first programme of the ‘Build up Skills’ series. The Cyprus Productivity Centre also took part in projects such as ‘WE-Qualify’.

(xvii) Training seminars were conducted by private universities for students, employees and training staff, to increase awareness on ES.

(xviii) The Energy Service and other organisations operate Facebook, Twitter and YouTube accounts to promote, among other things, ES and RES.

(xix) Licensed private training organisations organise training programmes and hold examinations for energy auditors (category A: it covers all buildings irrespective of floor area and type of air conditioning system, including, among other things, ports, airports, road lighting systems; category B: industrial facilities and processes, agricultural facilities; and category C: transport operations, excluding air and sea transport). Would-be energy auditors who meet the requirements laid down in national legislation may apply for enrolment in the register kept by the competent authority and pursue the occupation of energy auditor.

(xx) Issuance and circulation of a newspaper by the Energy Service, to foster the provision of information to manufacturers, importers, suppliers and traders dealing with energy-related products.

(xxi) Launch of information campaigns on the media from 2017

3.1.5 Availability of qualification, accreditation and certification schemes (Article 16)

1. The provisions on the availability of qualification, accreditation and certification schemes have been transposed in the national legislation as follows:

    1. Energy auditors - by RAA 184/2012; the End Use Energy Efficiency and Energy Services (Energy Auditors) Regulations of 2012 (regulating matters relating to the training and licensing of energy auditors for buildings, industries and transport).

    2. Energy service providers - by RAA 210/2014 - the End Use Energy Efficiency and Energy Services (Energy Service Providers) Regulations (regulating matters relating to the licensing of energy service providers and specifying the minimum issues to be regulated through energy efficiency contracting).

3. Energy managers – by RAA 344/2016 - the Energy Efficiency (Energy Managers) Decree of 2016 (regulating matters relating to the training and duties of energy managers).

2. Article 6 of the Amending Law (amending Article 8 of the basic Law) covers the need to specify the certification schemes and/or other equivalent professional qualification schemes for building envelope installers and the method used to make them publicly available.

3. As regards whether or not the national technical training level is adequate and the qualification, certification and accreditation schemes are objective and reliable, and as regards the method used to ensure transparency for consumers and the reliability and contribution towards energy efficiency targets of certification and accreditation schemes and training programmes that are made publicly known, please note that the legislation provides as follows:

   (i) The competent authority makes sure that the licensing method for energy auditors, energy service providers and energy managers, as well as the certification scheme and/or other equivalent professional qualification schemes for building envelope installers are made known to energy end users.

   (ii) The competent authority ensures that the information on available energy efficiency improvement schemes and the relevant financial and legal frameworks are transparent and widely disseminated to all interested market operators, such as energy end users, builders, technical system installers, architects, engineers, qualified experts, heating system inspectors, air conditioning system inspectors, energy auditors and building envelope installers.

   (iii) The competent authority encourages the provision of information to banks and other financial institutions concerning options for participation in financing programmes for energy efficiency improvement, such as options for participating in public-private partnerships.

(iv) The competent authority establishes appropriate conditions for market operators to provide adequate and targeted information and advice to energy end users on energy efficiency.

(v) The competent authority and the local and regional authorities promote information, mobilisation and training initiatives to inform people of the benefits resulting from the adoption of energy efficiency improvement measures.

(vi) The competent authority ensures that appropriate measures are taken to promote and facilitate the efficient use of energy by small energy end users, including domestic customers. These measures may include:

   (a) tax incentives;
   (b) access to financing, loans or grants;
   (c) provision of information;
   (d) exemplary projects;
   (e) workplace activities;
   (f) communication to energy end users of changes that are cost-efficient and easy-to-implement relating to the use of energy and information about energy efficiency measures.

4. In addition, with regard to the EPBD, a description of the existing training schemes for professionals in the energy efficiency sector is provided in paragraphs 4.1 and 4.3 of the revised strategy for mobilising investment in the renovation of buildings (**Annex F**).

5. The existing qualification, accreditation and certification schemes are summarised in the table below.

Table 10: Existing qualification, accreditation and certification schemes.

No	Description of existing recognition scheme	Qualifications
1	**Qualified expert (RAA 164/2009, RAA 39/2014)**	**Qualified expert's qualifications** **Residential buildings (dwellings):** 1. At least 1 year of proven experience in the buildings sector or in energy issues or building technical systems. 2. Certificate that he has successfully passed the examinations held by the evaluation agency. 3. Enrolment in the fields of architecture or civil/mechanical/electrical/chemical/environmental engineering of ETEK. **Non-residential buildings:** 1. At least 3 years of proven experience in the buildings sector or in energy issues or building technical systems or issuance of at least 90 energy performance certificates for residential buildings. 2. Certificate that he has successfully passed the examinations held by the evaluation agency. Enrolment in the fields of architecture or civil/mechanical/electrical engineering of ETEK.
2	**Air conditioning system inspector (RAA 62/2017**)	**Air conditioning system inspector's qualifications:** 1. At least 3 years of professional experience in the design, contracting, maintenance of air conditioning systems for buildings. 2. Holder of category I certificate in accordance with Regulation (EC) No 303/2008, issued by a certification organisation on the basis of the Emissions of Certain Fluorinated Greenhouse Gases (Certification of Enterprises and Staff for Fixed Cooling / Air Conditioning Equipment and Heat Pumps) Regulations. Enrolment in the field of mechanical engineering of ETEK.
3	**Heating system inspector (RAA 63/2017)**	**Heating system inspector's qualifications:** 1. At least 3 years of professional experience in the design, contracting, maintenance of heating systems for buildings. 2. Certificate that he has successfully passed the examinations held by the evaluation agency. 3. Enrolment in the field of mechanical engineering of ETEK.
4	**Certificate for small-scale RES system installers (RAA 19/2014)**	**Installer categories:** Installers of boilers and biomass heating appliances Installers of heat pumps Installers of solar PV systems Installers of solar thermal systems Would-be installers who have the qualifications required by the Regulation should attend and successfully complete, by examination, a specialised theoretical and practical training programme. The competent authority should grant a certificate of competence to each installer for a specific category or categories of systems for which

		they have enrolled.
5	**Certification of energy inspectors (RAA 184/2012)**	**Categories of Energy Auditors:** A: all buildings irrespective of floor area and type of air conditioning system. Includes, among other things, ports, airports, road lighting systems. B: industrial facilities and processes, agricultural facilities. C: transport. **Energy auditors' qualifications:** Engineers enrolled in ETEK. Mandatory attendance of training programme. Examinations successfully passed. 3 years of relevant experience. Enrolment in the register kept by the competent authority.
6	**Certification of energy service providers (RAA 210/2014)**	They must: Employ or have a contract with at least one energy auditor. Have sufficient technical, administrative, organisational and legal capacities for negotiating and concluding the necessary energy efficiency contracts with customers. Be able to implement projects consisting in purchasing, installing and/or replacing materials and equipment, including maintenance thereof, and monitoring and measuring the savings achieved. Have adequate knowledge of the market and of the prices of materials and equipment for energy savings interventions, as well as the ability to carry out a cost analysis of the investment and to calculate the expected income and profit, while assessing risks and identifying ways to address them. Be able to handle and secure financing for the interventions. Be able to provide energy services with guaranteed performance and to assume technical and financial risks for meeting the targets agreed upon.
7	**The Energy Managers Decree of 2016 (RAA 344/2016)**	To further enhance energy efficiency in companies, and private and public organisations, the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism is promoting the 'energy manager' arrangement. A decree adopted in 2016 has defined the training and duties of energy managers. An energy manager's duties include, among other things, proposing actions and making recommendations to an organisation's management for reducing energy consumption. This helps increase energy efficiency on a voluntary basis through a company's, organisation's or government authority's own procedures too. The Energy Service of the Ministry of Energy, Commerce, Industry and Tourism has announced that the 'European Energy Manager' (EUREM) training programme, as implemented by the Cyprus Energy Agency, has been approved as a training programme for energy managers in accordance with the Energy Managers Decree of 2016 (RAA 344/2016).

3.1.6 Energy Services (Article 18)

1. For the purpose of:

(i) implementing Article 9 of the End Use Energy Efficiency and Energy Services Laws of 2009 and 2012 Laws on Energy Efficiency in End Use and Energy Services (Law 31(I)/2009 and Law 53(I)/2012); and

(ii) transposing Articles 2(24) and (27), 16(1), 18(1)(a)(i), (c), (d)(i) and (ii), (2)(a) and (c) and Annex XIII to EU Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC;

the Ministry of Energy, Commerce, Industry and Tourism (MECIT) drafted the End Use Energy Efficiency and Energy Services (Amending) Law and the End Use Energy Efficiency and Energy Services (Energy Service Providers) Regulations of 2014 (RAA 210/2014).

The **register of energy service providers** is posted on the MECIT website (http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument)

The End Use Energy Efficiency and Energy Services (Energy Service Providers) Regulations of 2014 aim to regulate matters relating to the provision of energy services and to the conclusion of energy efficiency contracts. In particular, the Regulations regulate matters relating to:

(a) The operating conditions and the requirements for enrolment of energy service providers in the register of energy service providers and the issuance of the relevant licence by the competent authority (Energy Service of MECIT).

(b) The duties of the Energy Auditors Committee in relation to energy service providers.

(c) The type of energy services provided to final consumers through energy efficiency contracts and the minimum provisions to be included in such contracts.

(d) The stages to be followed by energy service providers to confirm increasing energy and financial benefits.

(e) The way in which the competent authority should audit and evaluate the energy services provided.

The Regulations were drawn up taking into account the practices followed in other countries and the experience from the participation of the Energy Service of MECIT in the EU programme 'Concerted action for the energy services Directive 2006/32/EC' (subsequently renamed into 'Concerted action for the energy efficiency Directive 2012/27/EC'), aiming to assist Member States in the implementation of the Directive's provisions.

The End Use Energy Efficiency and Energy Services (Amending) Law of 2015 aims is to give legal force to some of the Regulations' provisions and to establish/replace terms and definitions in compliance with the relevant provisions of Directive 2012/27/EU. Moreover, the law includes provisions on the protection of business information and personal data, as well as provisions on penalties to be imposed on those breaching the provisions of the regulations and/or decrees adopted on the basis of the law.

Information on exemplary contracts for energy service providers, with best practices for energy efficiency contracting and for lifting regulatory and non-regulatory barriers that prevent such contracting, is posted on the MECIT website as follows: (a) support document 'Shared benefit contract', and (b) support document 'Guaranteed performance contract' (http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument).

2. To handle complaints lodged in relation to energy service contracts, the above Regulations confer additional competences on the Energy Auditors Committee, including the handling of such complaints. Moreover, the Law has also provided for an independent scheme, e.g. an intermediary, to handle complaints relating to energy service contracts.

3. No measures have been taken so far to allow independent market intermediaries to play a role in stimulating market growth with regard to the demand for and offer of energy services, nor measures to ensure that energy distributors, distribution system operators and retailers refrain from activities that could obstruct the demand and supply of energy services or prevent market growth for the services concerned. However, such provisions have been included in the transposing draft law, and the adoption of the relevant measures will be decided after transposing the Directive into national legislation.

4. At this stage, the energy services market is not considered to be mature. However, the implementation of the Regulations on the operation of energy service providers and the efforts to identify and lift barriers to market growth in energy services in Cyprus are expected to make the market more mature in the years to come. Furthermore, in order to promote energy services in the public sector, the working group set up to deliver on the obligation to improve the energy efficiency of government buildings under Directive 2012/27/EU (reference to that is made in paragraph 4.1 of Annex F) is considering the granting of financing for the implementation of energy saving measures through the provision of energy services and energy performance contracting (EPC). For this purpose, the Department of Electrical and Mechanical Services is currently preparing template documents for a tender intended to select energy service providers, also including Energy Performance Contract templates. The success of pilot projects in the public sector is expected to identify problems relating to the provision of energy services and propose ways to resolve them, also being an example for the private sector. To ensure further growth of this sector, a study was carried out in cooperation with GIZ, Germany, and an effort will be made to implement the study's recommendations to the maximum extent possible.

5. In the following years, a limited number of pilot energy efficiency contracts are expected to be signed by public authorities in the context of Cyprus' commitment to an annual energy upgrading of 3 % of the useful floor area of buildings owned by the central government, whereas it is impossible to currently estimate the number of contracts.

6. To date, 22 legal persons have been entered in the register of energy service providers. Based on the energy service contracts entered into by them and on the information collected by the competent authority, as duly authorised by law, it will be possible to accurately identify the fields in which energy service providers operate, as well as the types of services rendered. It will also be possible to estimate the total value of the energy savings programmes and the total value of potential energy efficiency programmes in the non-residential sector, as the above Regulations have provided that energy service providers should:

    (a) submit to the competent authority, upon request, the energy performance contracts concluded with final consumers as well as any other documents and information requested for the purpose of evaluating the energy services provided;

    (b) keep a record of all valid energy performance contracts from the date of signing up until 3 years after expiry thereof, including the relevant reports, measurements, calculations and other relevant documents; energy service providers should, upon request, allow the competent authority to access the record;

    (c) submit to the competent authority, within 30 days from the end of each calendar year, an annual list of the energy performance contracts concluded in the previous year, which must include a short description of each contract.

3.1.7 Other horizontal measures to promote energy efficiency (Articles 19 and 20)

1. Regarding other horizontal measures to promote energy efficiency and the implementation of Article 19 EED, as well as the effort to lift regulatory and non-regulatory barriers, the draft law amending the End Use Energy Efficiency and Energy Services Laws of 2009 to 2015 proposes that the Council of Ministers may adopt regulations on:

   (a) the split of incentives between the owner and the tenant of a building or among owners, with a view to ensuring that these parties are not deterred from making efficiency-improving investments by the fact that they will not individually obtain the full benefits or by the absence of rules for dividing the costs and benefits between them; and

   (b) the procedures to be applied with a view to ensuring that individual public bodies are facilitated to make investments in improving energy efficiency and to outsource a part of the services included in long-term energy performance contracting.

2. As regards buildings, a more detailed analysis of the barriers and measures set out in Article 19(a) and (b) is provided for in paragraph 4.6 of the 'Strategy for mobilising investment in the field of building renovation' (**Annex F**).

3. A national energy efficiency fund was established in 2003 with the title 'Special Fund for Renewable Energy Sources (RES) and Energy Savings (ES)', under the Fostering and Promoting the Use of Renewable Energy Sources and Energy Savings Law of 2003 (Law 33(I)/2003). The Fund aims to encourage the use of RES and promote energy savings. According to the provisions of the grant schemes currently in force, the following activities may be subsidised or financed:

   - generating or purchasing electricity from RES, as the case may be;

- energy savings installations, equipment or activities;
- programmes for promoting RES, energy savings, including cogeneration of heat and power, and providing the public with information.

4. The Special Fund is managed by the Special Fund Managing Committee, comprising the following members:

   - the Director-General of the Ministry of Energy, Commerce, Industry and Tourism (MECIT) or a representative thereof, as Chair of the Committee;
   - the Director-General of the Ministry of Finance or a representative thereof;
   - the Director-General of the Planning Bureau or a representative thereof;
   - the Director for Commerce and Industry, responsible for energy issues in MECIT, or a representative thereof;
   - the Accountant-General of the Republic of Cyprus or a representative thereof;
   - a representative of ETEK.

5. Under the general supervision of the Minister for Energy, Commerce, Industry and Tourism, the Committee has the power and duty to administer the Fund's cash flows in order to pursue and achieve the targets set by the RES and ES legislation. In particular (and without prejudice to the above), it is responsible for:

   - financing or subsidising, subject to the terms and provisions of the schemes, various activities aiming at the use of RES and the promotion of ES;
   - checking, evaluating and approving applications for obtaining subsidies or financing;
   - making all necessary disbursements or expenses in relation to the Fund's purposes;
   - investing any reserves of the Fund in such a manner and to such an extent as indicated by the Minister for Energy, Commerce, Industry and Tourism, with approval from the Minister for Finance;

- carrying out, either on its own or in cooperation with any other legal or natural person, other activities which may contribute towards achieving the Fund's aims.

6. The operation of the Fund does not cause any significant interactions with other policy measures (e.g. energy efficiency obligation schemes, EU cohesion policy funds, etc.). The Cypriot State has not provided for the fulfilment of obligations in relation to the renovation of central government buildings (as set out in Article 5(1) EED) through an annual contribution to the national energy efficiency fund (NEEF) of an amount equal to the investments required to fulfil these obligations.

7. Decision No 72 911 of the Council of Ministers was adopted on 2 December 2011 to approve the deposit to the Special Fund for RES and ES of the required percentage of the income from the annual emission allowances, as required for the Fund's viability.

8. Also, Article 10(1)(e) of the Fostering and Promoting the Use of Renewable Energy Sources and Energy Savings Law (Law 112(I)/2013) provides for the deposit to the Special Fund of part of the income from emission allowances. However, there is no obligation to use such income exclusively for improving the energy efficiency of buildings.

9. To date, the Cypriot State has not used the income from annual emission allowances to develop innovative financing schemes with a view to meeting the energy efficiency improvement targets for buildings, but has reserved that right for the future, as Article 21(3) of the Greenhouse Gas Emission Allowance Trading Law (Law 110(I)2011) has granted the State said right.

3.1.8 Energy savings from horizontal measures

1. Please note that there is no available information with regard to all the horizontal energy savings measures referred to above. The only information that is available and the energy savings calculations that have been made relate to savings achieved under the measures implemented to attain the target referred to in Article 7.

2. Information on the savings achieved from the implementation of measures aiming to attain the target referred to in Article 7 is provided in paragraph 3.1.1 and in Tables 6 and 8 of Chapter 2 of the NEEAP, which refers to the contribution of those measures towards the end use targets for 2016 and the primary use targets for 2020.

3.1.9 Financing of horizontal measures

1. There is available information on the financing of horizontal measures only for some of the measures implemented to attain the target referred to in Article 7 of the Directive. This information is presented below.

Table 11: Financing of horizontal measures.

No	Description of measures	Grant amount[6]
1	Energy efficiency and RES promotion scheme for dwellings ('Save & Upgrade' scheme for dwellings).	EUR 6 892 770
2	Energy efficiency and RES promotion scheme for enterprises ('Save & Upgrade' scheme for enterprises).	EUR 8 980 267
3	Installation of photovoltaic systems for autoproduction by business consumers and photovoltaic systems using the net metering method in the residential sector.	EUR 5 625 329

3.2 Energy efficiency measures for buildings

3.2.1 Review of the requirements under the EPBD recast (2010/31/EU)

1. Calculations on cost-optimal levels of minimum energy performance are already posted (additional calculations are yet to be posted) on the website of the Energy

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[6] Please note that the amounts shown above are preliminary, as the evaluation of all the applications submitted for a grant and the implementation of all the investments has not been completed yet.

Service, as indicated in **Annex I,** whereas the national targets for nearly zero-energy buildings are set out in detail in the 2nd NATIONAL ACTION PLAN FOR INCREASING THE NUMBER OF NEARLY-ZERO ENERGY BUILDINGS (**Annex C**).

2. The measures adopted in compliance with the requirements of Article 10(2) EPBD are set out in paragraphs 4.2, 4.3, 4.4, 4.5 and 4.7 of **Annex F** (Strategy for mobilising investment in the field of building renovation).

3. The provision for alternative measures for heating and cooling systems (Articles 14(4) and 15(4) EPBD) does not apply to Cyprus. Cyprus has provided for, and conducts, regular inspections on, heating and cooling systems in accordance with the provisions of the Regulation on the Energy Performance of Buildings Law and of the relevant secondary legislation adopted in that respect.

3.2.2 Building renovation strategy (Article 4)

1. The revised strategy for mobilising energy savings investment is included in **Annex F** (Strategy for mobilising investment in the field of building renovation).

3.2.3 Complementary measures to address the issue of the energy efficiency of buildings and appliances

1. Complementary measures to address the issue of energy efficiency in residential and non-residential buildings are analysed in other chapters of the NEEAP.

3.2.4 Energy savings from measures addressing the issue of the energy efficiency of buildings

1. Energy savings from the implementation of measures relating to the improvement of the energy efficiency of buildings are shown in Tables 6 and 8 of Chapter 2of the NEEAP. Measures Nos 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13 and 14 relate specifically to the energy efficiency of buildings.

3.2.5 Financing measures for the energy efficiency of buildings

1. A detailed description of the financing of measures for the energy efficiency of buildings is provided for in paragraphs 4.2, 4.5 and 5 of **Annex F** (Strategy for mobilising investment in the field of building renovation). Moreover, financial data on

measures Nos 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13 and 14 relating to the energy efficiency of buildings are provided in Annex G of the NEEAP.

3.3 Energy efficiency of public bodies' buildings (Articles 5 and 6)

3.3.1 Central government buildings (Article 5)

1. Information on the list of heated and/or cooled central government buildings is provided in paragraph 4.5 of **Annex F** (Strategy for mobilising investment in the field of building renovation) and in the alternative approach for improving the energy efficiency of buildings used by central government authorities in accordance with Article 5(6) of Directive 2012/27/EU on energy efficiency (Exemplary role of buildings owned by the central government).

2. Cyprus applies the alternative approach for attaining the target referred to in Article 5 of the Directive. Based on the alternative approach, Cyprus should save 3 316 GWh per year in the 2014-2020 period by implementing energy savings measures in the public sector. More information on how to calculate and implement the annual target is included in the alternative approach, which is posted on the website of the Energy Service, as indicated in **Annex I.**

3. Information on how to calculate the obligation to renovate buildings owned by public bodies is provided in paragraph 4.5 of **Annex F** (Strategy for mobilising investment in the field of building renovation).

3.3.2 Buildings of other public bodies (Article 5)

1. Information is provided in paragraph 4.5 of **Annex F** (Strategy for mobilising investment in the field of building renovation).

2. Moreover, the relevant provisions of the Directive relating to other public bodies' buildings were transposed in Article 14 of the End Use Energy Efficiency and Energy Services (Amending) Law of 2015 (Law 149(I)/2015).

3.3.3 Purchasing by public bodies (Article 6)

1. Article 6 of the Directive entitled 'Purchasing by public bodies' requires, inter alia, that Member States ensure that the central government (administrative services whose powers cover the entire territory of Member States, as listed in Annex IV to Directive 2004/18/EC) purchase only products, services and buildings with high energy-efficiency performance, insofar as that is consistent with cost-effectiveness, economic feasibility, wider sustainability, technical suitability, as well as sufficient competition, as referred to in Annex III to the Directive.

2. Article 6 also states that Member States should encourage public bodies, including at regional and local levels, with due regard to their respective competences and administrative set-up, to follow the exemplary role of their central governments to purchase only products, services and buildings with high energy-efficiency performance.

3. To ensure that the central government complies with the above requirements referred to in Article 6 of the Directive, these requirements were, following consultation with the public procurement authority, i.e. the Treasury of the Republic of Cyprus, transposed in the End Use Energy Efficiency and Energy Services (Amending) Law of 2015 (Law 149(I)/2015).

4. In particular, the basic Law was amended by adding a new Article 15 on purchasing by public bodies, which provided as follows:

   (a) Central government authorities should purchase only products, services and buildings with high energy-efficiency performance. If central government authorities decide to rent a building with no high energy-efficiency performance, this must be justified by them in terms of cost-efficiency, economic feasibility, wider sustainability, technical suitability, as well as sufficient competition, as referred to in Annex II.

   (b) The obligation set out in the first indent applies to contracts for the purchase of products, services and buildings by central government authorities whose value is equal to or exceeds the lower thresholds specified in Article 19(1) of the Coordination of Procedures for Entering into Works Contracts, Supply Contracts and Service Contracts and Similar Matters Law of 2006, as these thresholds are revised each time under Article 92 of that Law.

(c) The competent public procurement authority may issue circulars on the application of paragraphs (a) and (b).

(d) In applying paragraph (c), the competent public procurement authority may request and obtain the views of other competent State services.

(2) The obligation referred to in paragraph (a) applies to the contracts entered into by the armed forces insofar as its application does not cause any conflict with the nature and primary aim of the activities of the armed forces. This obligation does not apply to contracts for the supply of military equipment, as defined by the Coordination of Procedures for Entering into Works Contracts, Supply Contracts and Service Contracts by Contracting Authorities or Entities in the Fields of Defence and Security and Similar Matters Law of 2011.

(3) The competent public procurement authority encourages public bodies, including at regional and local levels, with due regard to their respective competences and administrative set-up, to follow the exemplary role of their central government authorities to purchase only products, services and buildings with high energy-efficiency performance. The competent public procurement authority encourages public bodies, when tendering service contracts with significant energy content, to assess the possibility of concluding long-term energy performance contracts that provide long-term energy savings.

(4) Without prejudice to paragraph (a), when purchasing a product package covered as a whole by a delegated act adopted under Directive 2010/30/EU, contracting authorities may require that the aggregate energy efficiency take priority over the energy efficiency of individual products within that package, by purchasing the product

package that complies with the criterion of belonging to the highest energy efficiency class.

5. With a view to more effectively applying Article 6, the Treasury of the Republic of Cyprus, following consultation with the Ministry of Energy, Commerce, Industry and Tourism, issued and sent a circular (ΓΛ ΑΑΔΣ 76) to all contracting authorities falling within the definition of central government authorities, as well as to the contracting authorities in the broader public sector (organisations governed by public law, local authorities, etc.), on 10 August 2016. The circular provided information and explanations on the central government authorities' obligation to apply the provisions of the Article concerned in purchasing products, services and buildings. Guidance was also given on the minimum energy performance requirements to be met in renting buildings. Contracting authorities in the broader public sector were urged by the circular to purchase products, services and buildings with a high energy efficiency rating. The circular also provided guidelines on how to apply the Article concerned, concerning in particular the terms 'cost-effectiveness', 'economic feasibility', 'wider sustainability', and 'sufficient competition'. Guidance was also given regarding the parameters that could be taken into account in purchasing buildings and services. The communication also contained the contact details of officers of the Ministry of Energy, Commerce, Industry and Tourism who could provide additional clarifications. Moreover, the circular requested the contracting authorities to keep a list of the relevant contracts entered into in the last three years, also explaining why some of the requirements of the Law were not observed in certain cases.

3.3.4 Savings from measures in central government and other public bodies

1. The energy savings calculated from measures implemented to date in central government and other public bodies relate to the implementation of the GPP Action Plan, measures aimed at attaining the target referred to in Article 5 of the Directive, as well as individual investments implemented under the grant schemes of the Special Fund for RES and ES. These measures are identified with numbers 3.2, 6 and 12 in Tables 6 and 8 of Chapter 2 of the NEEAP.

3.3.5 Financing of energy efficiency measures for public bodies' buildings

1. Information is provided in paragraph 4.5 of **Annex F** (Strategy for mobilising investment in the field of building renovation).

3.4 Energy efficiency measures in industry

3.4.1 Key policy measures addressing the issue of energy efficiency in industry

1. The Special Fund for RES and ES was in operation up until the end of 2013. Grant scheme for encouraging the use of renewable energy sources and energy savings for natural and legal persons as well as for public sector bodies engaged in an economic activity. The investments covered by the grant scheme fall under two subcategories:

   (a) NA: Energy savings (ES)

   (b) NB: Renewable energy sources (RES)

2. In accordance with the provisions of the scheme for 2013, 'energy savings investment' means investment in systems, equipment and materials whose installation achieves at least 10 % energy savings in a specific application.

3. Energy-saving investments and investments in vehicles and mobile machinery were not deemed eligible. Furthermore, the design and construction of machinery or vehicles that consume fewer natural resources are not eligible activities for obtaining a grant under the energy savings category.

4. Eligible expenses also included the design costs, where necessary, subject to the restrictions set out in the relevant application forms for the different categories and subcategories of the scheme.

5. Category NA1 of the grant scheme applied only to existing undertakings operating in Cyprus for at least four (4) years. Financial aid was granted to energy investments in existing holdings of the undertakings in question, on condition that the building licence was issued by 28 December 2008.

6. There were five (5) subcategories of investments as follows:

   (a) NA1.1: Purchase / installation of new equipment for the recovery of waste energy, either directly or indirectly by recovery / recycling of discarded materials, product or employed medium.

   (b) NA1.2: Purchase / integration of new materials and equipment to reduce reactive power consumption and power losses.

   (c) NA1.3: Purchase/integration of new equipment for the production, transmission, distribution and use of energy.

   (d) NA1.4: Purchase/installation of a new energy management computer system and/or integration of automated direct energy regulation/switch-off devices.

   (e) NA1.5: Replacement of existing materials and/or equipment relating to subcategories NA1.1 to NA1.4.

7. The total amount expected to be made available in 2013 for this investment category was EUR 1 230 000.

8. The grant amounts per category and subcategory for the year 2013 are detailed in the table below.

Table 12: Grant rates per category and subcategory for grant schemes under the Special Fund for RES and ES for the year 2013.

No	INVESTMENT	Subsidy per type of grant	
		Regional aid	**De minimis aid / Special grant**
NA1	**Energy savings in existing undertakings**		
	NA 1.1 NA 1.2 NA 1.3 NA 1.4	15 % or 25 % or 30 % of the eligible budget, according to the category of the undertaking (large, medium, small). The maximum grant amount was EUR 50 000 per facility.	30 % of the eligible budget subject to the restriction of maximum eligible expenditures. The maximum grant amount was EUR 50 000 per facility.
	NA 1.5 Replacement of existing materials and/or equipment relating to subcategories NA1.1, NA1.2, NA1.3 and NA1.4.	-	30 % of the eligible budget subject to the restriction of maximum eligible expenditures. The maximum grant amount was EUR 50 000 per facility.

9. A grant scheme for encouraging the use of renewable energy sources and energy savings for natural and legal persons was in operation in 2015 and 2016. The grant schemes in operation are detailed below:

   (a) Plan for fostering the installation of photovoltaic systems, entitled ‘Solar energy for all’.

   (b) ‘Save & Upgrade’ scheme for enterprises (1st call).

10. The plan for fostering the installation of photovoltaic systems, entitled ‘Solar energy for all’, is broken down into three (3) subcategories:

    (a) Category A: Photovoltaic systems connected with the network using the net metering.

    (b) Category B: Photovoltaic systems intended for autoproduction for consumers enjoying commercial or industrial tariffs (commercial and industrial facilities, public buildings, agricultural and stock farming holdings, fisheries facilities, etc.).

    (c) Category C: Autonomous photovoltaic systems.

    Category B includes PV system installations which are implemented in holdings enjoying commercial or industrial tariffs (i.e. commercial and industrial facilities, public buildings, military camps, schools, agricultural and stock farming holdings, fisheries facilities) for power generation for own use (‘autoproduction’). The capacity of a PV system ranges between 10kW and 10 000kW per beneficiary and per facility, subject to the following conditions:

    (a) The maximum system capacity may not exceed 80 % of the consumer’s demand recorded in the previous year, except where a respective storage system is installed.

    (b) A design prepared by an independent engineer-designer is submitted for new facilities for which there is no recorded consumption profile.

From 2015 to 2016, ‘autoproduction’ power systems could be installed with a total capacity of 40MW, of which 2MW would be made available only for the 2014-2020 Rural Development Programme of the Ministry of Agriculture, Rural Development and Environment.

Category B includes autonomous PV system installations in a holding/parcel which are not connected to the EAC network. The maximum capacity of each PV system that can be installed under this category is specified by virtue of a CERA decision. Under the current policy, there is a general permission for the exemption of PV systems of up to 20kW.

11. The grant scheme ‘Save & Upgrade’ scheme for enterprises is implemented in the 2014-2020 period. It aims to ensure large-scale energy upgrading in building facilities used by natural or legal persons governed by private law, which are owners or tenants of building facilities and SMEs carrying out an economic activity. The scheme covered only investments for purchasing and installing new equipment / materials carried out in the absence or national or Community standards. The investments relate to mature technologies, exclusive of ones that are at a research and development stage.

    The 1st call issued for the scheme included two (2) types of investments:

    (a) Integrated energy upgrading of buildings, to achieve at least an energy category B in the energy performance certificate or to achieve at least 40 % energy savings compared to the total energy consumption of the building before the upgrade. The public contribution percentage stood at 50 % of the total approved budget of the proposal, with a maximum grant amount of EUR 200 000.

    (b) Integrated energy upgrading of buildings with a view to turning them into nearly zero-energy buildings. The public contribution percentage stood at 75 % of the total approved budget of the proposal, with a maximum grant amount of EUR 200 000.

    Generally speaking, the eligible expenditure of the scheme related to designs / purchasing of services and purchasing / installation / replacement of equipment.

12. OEB, in cooperation with EAC and the Energy Service, organise and take part in the annual ‘Save Energy’ exhibition. Printed material is distributed at the exhibition concerning the different energy savings technologies and renewable energy sources. Information is also provided to the general public concerning the provisions of the grant schemes. In the context of the exhibition, prizes are awarded to the most efficient energy savings investments implemented by natural and legal persons that applied for a subsidy under the grant schemes to the Fund for RES and ES.

13. Daily workshops are organised at a nationwide scale, intended for members of the Technical Chamber of Cyprus (ETEK), of the Cyprus Employers and Industrialist Federation (OEB) and of the Cyprus Chamber of Commerce and Industry (KEBE), hotel operators, businessmen, credit institutions, municipalities and communities, contractors, as well as the general public. The topics covered by the workshops related primarily to energy audits, the energy efficiency of buildings, energy labelling, energy savings and renewable energy sources technologies used for heating and cooling.

14. Licensed private training organisations organise training programmes and hold examinations for energy auditors (category A: it covers all buildings irrespective of floor area and type of air conditioning system, including, among other things, ports, airports, road lighting systems; category B: industrial facilities and processes, agricultural facilities; and category C: transport operations, excluding air and sea transport). Would-be energy auditors who meet the requirements laid down in national legislation may apply for enrolment in the register kept by the competent authority to pursue the occupation of energy auditor.

15. In accordance with Article 8(4) of Directive 2012/27/EU, enterprises that are not SMEs are subject to an energy audit. The energy audits are carried out in an independent and cost-effective manner by licensed energy auditors.

3.4.2 Savings from measures in industry

1. The energy savings calculated from measures implemented to date in the industry sector relate primarily to the grant schemes of the Special Fund for RES and ES which were in operation in the 2004-2013 period. These measures are identified with numbers 2.3 and 3.4 in Tables 6 and 8 of Chapter 2 of the NEEAP.

2. As regards the 'Save & Upgrade' scheme for enterprises, as referred to in paragraph 3.4.1 above, the calculations made for investments which have been approved and are being implemented, relate to enterprises in the tertiary and industry sectors. To date, the savings relating only to the industry sector have not been singled out to date.

3.4.3 Financing energy efficiency measures in industry

1. With regard to the financing of investments implemented in the industry sector, please note that a total grant of EUR 1 767 902 was made available by the Special Fund for RES and ES in the 2004-2013 period. These grants relate to the measures identified with numbers 2.3 and 3.4 in Tables 6 and 8 of Chapter 2 of the NEEAP.

2. No grant schemes were in place and no financing was granted for any energy efficiency measures in industry in 2014.

3. As regards the 'Save & Upgrade' scheme for enterprises, as referred to in paragraph 3.4.1 above, the investments which have been approved and are being implemented, relate to enterprises in the tertiary and industry sectors. To date, the grant amounts relating only to the industry sector have not been singled out to date.

3.5 Energy efficiency measures in the transport sector

3.5.1 Key policy measures addressing the issue of energy efficiency in the transport sector

1. The launch of the 4th Old Vehicle Scrapping and Replacement Scheme was announced on 11 October 2010. The scheme was implemented in 2011. Applications were admitted for a period of 2 months, the relevant deadline expiring on 13 December

2010. The 4th Scheme related to the payment of a grant equal to EUR 1 800 and covered the scrapping of M1 category motor vehicles, aged over 15 years, subject to the condition that a new car with CO2 mass emissions lower than or equal to 165 g/km would be purchased.

2. The new public transportation system entered into force in the second half of 2010. The new public transportation bodies replaced some of their vehicles with new ones driven by motors with low fuel consumption and pollutant emission levels, compared to the old vehicles that were replaced. Provincial bus transport companies have reorganised their routes, aiming to optimise their efficiency in this sector. Their websites contain a detailed map of the routes and the timetable of buses in order to facilitate passengers.

3. Moreover, a project was launched on 17 October 2008, including, among other things, the construction of the first bus lane in Cyprus, against a cost of EUR 18 399 001.30 + VAT, which was completed in 2011. The project is expected to strengthen public transportation and was co-financed by the EU (Structural Funds).

4. Before the end of 2011, the widening of the motorway that links the Alambra and the GSP intersections (entry to Nicosia) from four to six circulation lanes was completed. Works started on 11 January 2010 against a cost of EUR 32.4 million + VAT and were co-financed by the Trans-European Transport Networks Fund.

5. The latest amendment to the Motor Vehicles and Road Traffic Law (Law 100(I)/2013) of 9 September 2013 entered into force on 1 January 2014, which modified the annual vehicle tax to be paid for each M1 category motor vehicle, as it would be calculated from then on based on the carbon dioxide (CO2) emissions (combined cycle) in grams per kilometre (g/km), and this measure reduced the registration of vehicles with a high fuel consumption. Also, as of 1 January 2014, N2 and N3 (buses) and M2 and M3 (buses) category vehicles are registered insofar as they can prove compliance with the ‘EURO VI’ requirements on the emission of pollutants.

6. Furthermore, in the context of fostering eco-driving, the new traffic regulation has included a new chapter on environmentally friendly driving, including tips on efficient driving that can help cut down on fuel consumption.

7. In the context of the implementation of Regulation (EC) No 1222/2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters, authorised inspectors of the Energy Service perform market surveillance checks in order to identify cases of non-compliance with these provisions.

8. Based on the measurements taken by the new automatic meters installed by the traffic police at permanent locations, the annual average traffic is calculated for each part of the road network.

9. Technical and financial studies are carried out, aiming to improve the roads and upgrade the interchanges across Cyprus.

10. An effort is made to promote the implementation of the findings / recommendations of the Nicosia Integrated Mobility Master Plan, as prepared by private engineers. Alternative scenarios for the city were assessed in the context of the plan, making proposals for the road network, the public transport network, the network of cycle paths, the roads to be turned into pedestrian paths and the parking policy.

11. Based on the proposals made in the context of the study, the Department of Town Planning and Housing prepared the City Centre Plan, whose implementation is carried out by the Municipality of Limassol. A new road traffic study is expected to be prepared in 2016. The study will take the form of an ‘Integrated Urban Transport Plan’, as agreed within the context of the EU Jaspers initiative, placing the emphasis on public transport.

12. An effort is being made to implement the recommendations of the road traffic study for the broader urban area of Larnaca, as prepared by the foreign expert firm Colin Buchanan & Partners. Also, an effort is being made to implement the recommendations of the road traffic study for the broader urban area of Paphos, as

prepared by the foreign expert firms Colin Buchanan & Partners and Hughes Economic Planning.

13. Preparation and implementation of the Regulation of Bicycle Traffic Law. The draft law should regulate bicycle traffic in the road network (roads, cycle paths, cycle lanes and cycle corridors), the obligations of other road users to cyclists and the minimum equipment of a bicycle.

14. Licences were granted in 2017 for the set up of LPG pumps intended for vehicles. Also, the installation of LPG systems in vehicles started in 2017, aiming to reduce pollutant emissions and fuel consumption in older vehicles.

3.5.2 Savings from measures in the transport sector

1. This section presents the savings calculated for measures in the transport sector, as calculated using both ‘bottom-up’ methodologies for specific / individual actions and ‘top-down’ methodologies for the overall transport sector in Cyprus.

2. The energy savings from specific / individual actions under the Vehicle Scrapping Scheme and the Grant Scheme for Electric, Hybrid and Low-Pollutant Vehicles, with the corresponding end use and primary use contributions in 2012, 2016 and 2020, are included in the table below.

Table 13: Energy savings through specific/individual actions in the transport sector.

No	Description of measures	Implementation period	End use		Primary use	
			2016 TOE	2020 TOE	2016 TOE	2020 TOE
1	**Vehicle Scrapping Scheme**	**2008-2010**	**2 822.8**	x	x	x
	Grant Scheme for Vehicles	**2004-2009**	**1 073.5**	x	x	x
2	**Vehicle Scrapping Scheme**	**2008-2010**	x	x	x	167
	Grant Scheme for Vehicles	**2004-2009**	x	x	x	x

3. Please note that paragraphs 7 and 8 of Annex D provide further information on the Vehicle Scrapping Plan and the Grant Scheme, respectively.

4. As regards calculating the energy savings for the overall transport sector, please note that the energy efficiency rates cover the energy consumed in road transport operations for passengers and goods. Final energy savings were expressed as the sum of savings achieved per vehicle type.

5. Energy efficiency rates in the transport sector cover the total fuel consumption. Energy savings in road transport were calculated using the available energy rates for Cyprus, for the 2010-2016 period, drawn from the ODYSSEE database. Calculations were made on the basis of the M5 methodology (p. 48) set out in the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services'.

6. The table below presents the vehicle stocks per year from 2007 to 2016.

Table 14: Vehicle stock per category in Cyprus (2007-2016).

Year	Fuel consumption (Mtoe)	Stock of cars	Stock of buses	Stock of light vehicles	Stock of trucks
2007 (ref)	0.719	410 936	3 292	103 978	11 707
2008	0.778	443 517	3 402	107 010	12 785
2009	0.776	460 504	3 449	108.363	13 572
2010	0.785	462 652	3 403	105 129	13 399
2011	0.766	469 543	3 461	102 968	12 999
2012	0.713	475 462	3 557	99 781	12 059
2013	0.657	474 561	3 495	97 245	10 142
2014	0.640	478 492	2 581	93 381	9 407
2015	0.661	487 692	2 712	92 726	9 473
2016[7]	0.681	487 692	2 712	92 726	9 473

7. Furthermore, as regards energy consumption, the table below presents the energy consumption per vehicle and per year from 2007 to 2016, as well as the energy savings

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[7] Given that, while preparing the NEEAP there were no available data from the Statistical Service of Cyprus to calculate the energy savings for 2016, said savings were calculated assuming that the sector's total fuel consumption in 2016 was increased by 3 % compared to 2015 and that the vehicle stock in 2016 was the same as that in 2015.

per vehicle and the total energy savings in the transport sector per year in TOE, compared to 2007 (reference year).

Table 15: Energy consumption and savings per vehicle (2007-2016).

Year	Fuel consumption per vehicle (TOE)	Fuel savings per vehicle (TOE)	Total fuel savings (TOE)
2007 (ref)	0.779	0.000	0.00
2008	0.799	-0.020	-19 531
2009	0.776	0.003	2 918
2010	0.795	-0.016	-15 562
2011	0.777	0.002	1 504
2012	0.730	0.049	47 378
2013	0.687	0.092	88 077
2014	0.689	0.090	83 131
2015	0.705	0.074	68 992
2016[8]	0.726	0.052	49 162

Figure 18: Fuel consumption per vehicle (2007-2016) in TOE.

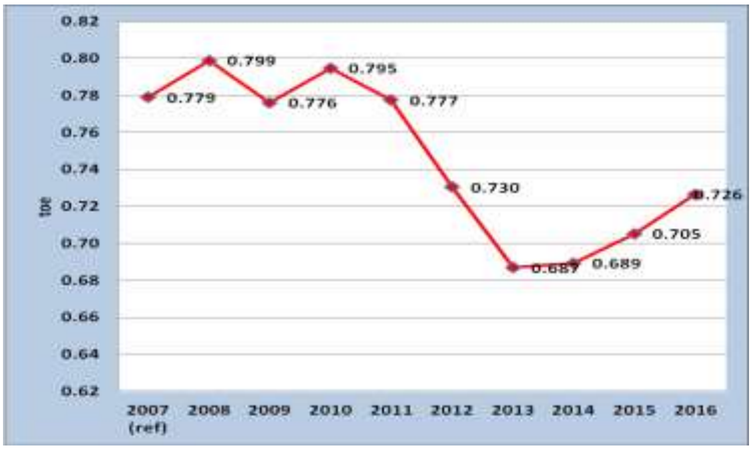


Figure 19: Fuel savings per vehicle (2007-2016) in TOE.

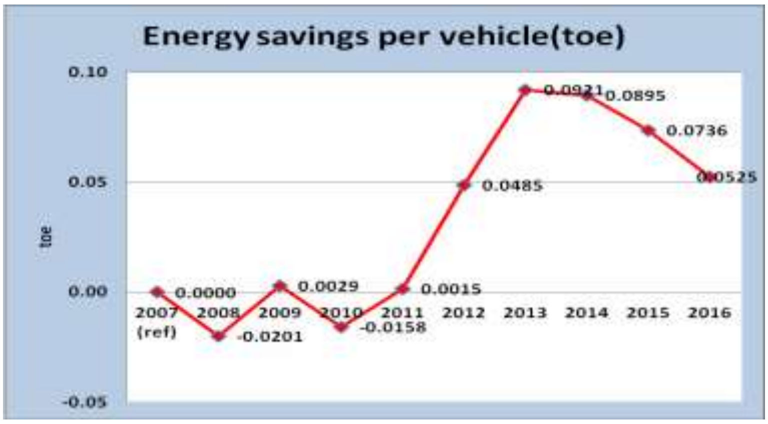
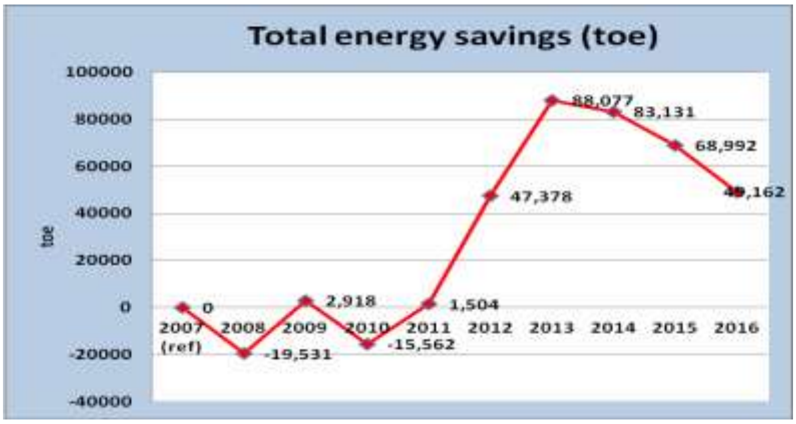


Figure 20: Total fuel savings in road transport (2007-2016) in TOE.



8. It is clear from the above figures and tables that there was a significant energy efficiency improvement in the transport sector in 2007-2016. This result was expected due to the different actions implemented in recent years in Cyprus, as set out above, also relating to a certain extent to the economic crisis that has hit the country in recent years. The reduced fuel consumption recorded in 2015 (possibly in 2016 too) compared to 2014 is largely due to the signs of recovery of the Cypriot economy and potentially due to a drop in fuel prices from 2015 onwards.

9. The year 2010 was used as reference year to calculate primary use energy savings for the 2020 target, and using the methodology set out above it was found that there were total energy savings of 63 926 TOE in 2016 compared to the reference year. Please refer to the table and figures below.

Table 16: Energy consumption and savings per vehicle (2010-2016) - Reference year 2010.

Year	Fuel consumption per vehicle (TOE)	Fuel savings per vehicle (TOE)	Total fuel savings (TOE)
2010(ref)	0.795	0.000	0
2011	0.777	0.017	17 027
2012	0.730	0.064	62 756
2013	0.687	0.108	103 146
2014	0.689	0.105	97 756
2015	0.705	0.089	83 756
2016[8]	0.726	0.068	63 926

Figure 21: Fuel savings per vehicle (2010-2016) in TOE.

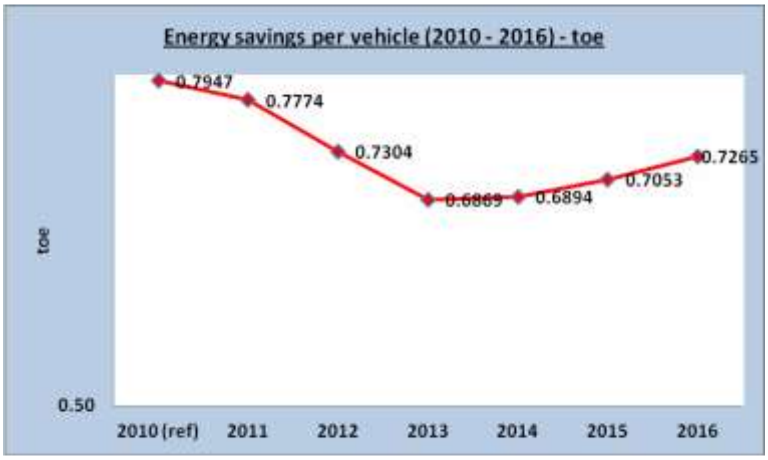
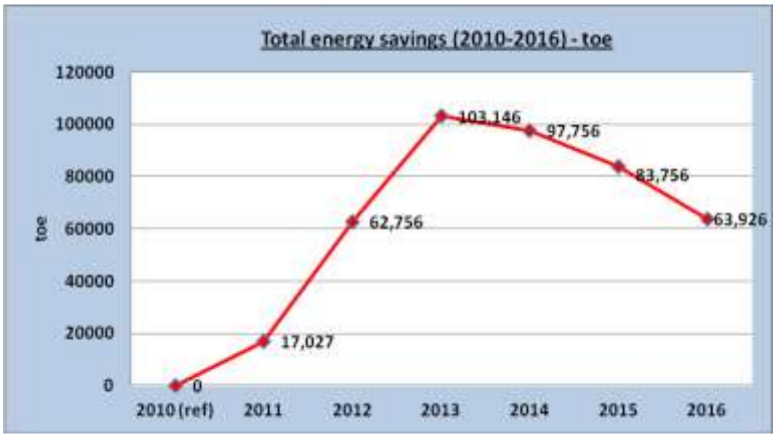


Figure 22: Total fuel savings in road transport (2010-2016) in TOE.



3.5.3 Financing energy efficiency measures in the transport sector

1. A total subsidy of EUR 2 611 923 was granted to finance investments in the transport sector in the 2004-2009 period, as subsidised by the Special Fund for RES and ES. A subsidy of EUR 5 785 055 was granted under the Vehicle Scrapping Plan. Furthermore, the description of the measures provided in paragraph 3.5.1 above also refers to the financing of other measures that are related to the transport sector.

3.6 Promotion of efficient heating and cooling (Article 14)

3.6.1 Concise assessment

1. To transpose Article 14 EED, the Republic of Cyprus amended the Fostering the Cogeneration of Power and Heat Law.

2. One of the key obligations under the Law consists in preparing a concise assessment of the high efficiency cogeneration of heat and power and of efficient district heating and district cooling. To that end, technical assistance was obtained from, and a relevant study was prepared by the Joint Research Centre (JRC). The study was completed and notified to the Commission on 12 April 2016. The study was based on the methodology developed by the JRC itself, as made available by the Commission to other Member States too. In implementing the concise assessment, the JRC carried out a cost-benefit analysis that covered the entire territory of the Republic of Cyprus and was based on the climatic conditions, the economic feasibility and the technical suitability, in accordance with Annex IX.1 to the EED. The cost-benefit analysis aims to facilitate the identification of the most resource- and cost-efficient solutions to meeting heating and cooling needs.

3. For the purposes of the cost-benefit analysis, it is necessary to set up a basic scenario to be used as a basis for assessing other alternative scenarios. The basic scenario will describe the current state of affairs in terms of the demand for heating and cooling, its development prospects and the energy supply and conversion method, based on the current know-how and technological advances, taking due account of existing and future energy policy measures. A separate basic scenario was set up for each sector / subsector of economic activity, to describe the potential development of the demand for heating and cooling in the 2013-2050 period.

4. ‘Alternative scenario with a positive net present value (NPV)’ means that the high efficiency technology examined in relation to the basic scenario is more competitive in economic terms (economic potential). Based on the cost-benefit analysis, the following technologies have an economic potential:

Technologies applied in the residential and tertiary sectors.

- Split type heat pumps (having a higher economic net present value in all types of buildings).
- Heat pumps connected to the central plumbing water distribution network (for detached houses, terraced houses, hospitals, hotels and schools).
- Recovery of waste heat from power plants and distribution of that heat via a district heating / cooling network (only for the cities of Limassol and Larnaca).
- Solar thermal systems (for detached houses, terraced houses, hospitals and schools).

Technologies used in the industry sector.

- Cogeneration of heat and power (CHP) plants and high efficiency boilers using municipal waste as fuel.
- Solar thermal systems.

Technologies used in agriculture and stock farming.

- CHP plants and high efficiency boilers using animal and industrial waste as fuel for greenhouses.

5. The primary energy which can be saved from high efficiency technologies was estimated, based on their economic potential, as follows:

(1) Split type heat pumps in the residential and tertiary sectors will achieve savings of 800 GWh (22 %) and 400 GWh (15 %), respectively.

(2) The recovery of waste heat from power plants and distribution of that heat via a district heating / cooling network will achieve savings of 82 GWh for Larnaca and 132 GWh for Limassol.

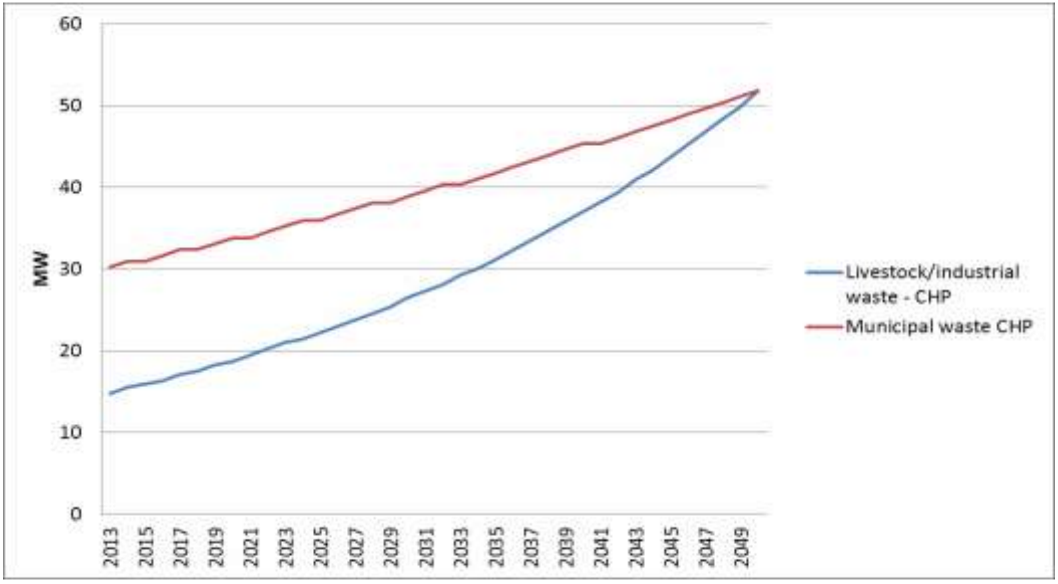
(3) Cogeneration of heat and power (CHP) plants and high efficiency boilers using municipal waste as fuel in the industry sector (exclusive of the 'other industries' sector) will achieve savings of 64 GWh (45 %).

(4) Solar thermal heating systems will achieve savings of 18 GWh (30 %) in the industry sector, 1772 GWh (65 %) in the residential sector and 173 GWh (57 %) in the tertiary sector.

(5) CHP plants and high efficiency boilers using animal and industrial waste as fuel will achieve savings of 64 GWh (48 %), in the agricultural and stock farming sector.

The expected gradual development of HECHP plants in the agricultural and stock farming sector is presented below.

Figure 23: Economic potential forecast for high efficiency cogeneration of heat and power (HECHP) installations.



6. Based on the concise assessment, in respect of all the technological solutions with a positive result in the economic cost-benefit analysis (economic CBA), there is a positive result in the financial cost-benefit analysis (financial CBA) too, except for CHP plants,

which are analysed below. If there is a positive financial CBA result, this means that the technologies referred to per sector in paragraph 4 above are commercially viable and there is no need whatsoever for public financial support.

7. As referred to above HECHP plants with a positive NPV are identified in the industry sector and in the agricultural and stock farming sector. Despite having a positive NPV (economic CBA), HCP plants using animal and industrial waste as fuel in the agricultural and stock farming sector have a negative NPV (financial CBA), and therefore this technology needs public support to become commercially viable. The following two support alternatives were proposed, to help achieve a positive NPV result:

    - to grant a subsidy equal to 50 % of the capital cost of a CHP plant;
    - to offer the (animal and industrial) waste for free to the plant operator.

    The installed capacity of such plants is expected to reach 52 MW by 2050. The cost of the public financial support to be granted is expected to reach EUR 7 million.

8. Recovery of waste heat from existing power plants (and/or conversion thereof in HECHP plants) and the distribution of that heat via a district heating/cooling network appears to be a viable solution for Limassol and Larnaca, where there power plants currently in operation. Such a system could potentially offer up to 670 GWh of heat in Limassol and 409 GWh of heat in Larnaca.

9. Having regard to the above results, MECIT decided to prepare a more detailed analysis at a local level, specifically for areas with high energy consumption levels, before laying down a specific policy. The analysis has started and will be completed in August 2017.

3.6.2 Individual installations: cost-benefit analysis and results

1. No cost-benefit analysis has been carried out to date.

3.6.3 Individual installations, exemptions and decisions introducing exemptions

1. The Republic of Cyprus has decided to adopt all the exemptions referred to in Article 14(6) and (8) EED. The Commission has been notified accordingly.

3.7 Energy transformation, transmission, distribution, and demand response (Article 15)

1. Please note the following regarding the measures adopted by the Cyprus Transmission System Operator (DSMK) with regard to electricity:

   (i) DSMK is obliged by law to encourage the penetration of RES in the electricity network. Many RES systems, such as small PV systems and small wind farms are dispersed, i.e. they are connected to the distribution system, but not to the transmission system. Therefore, they are located closer to electricity consumption centres. This results in reduced electricity on the lines used to transmit power from remote conventional power plants to consumption centres, leading to reduced energy losses in power transmission.

   (ii) The operating voltage of overhead lines and transmission substations was upgraded from 66 kV to 132 kV. This upgrading was necessary due to the gradual increase in the power transmitted in part of the network with initially limited consumed power. Please note that doubling the voltage has led to a significant reduction in thermal losses both in power transmission (over 75 % reduction under conditions of own load and an upgraded line - conductor with an increased cross-section) and in consumption through the transformers on which losses are reduced by more than 5 % (of the rated power).

(iii) Satisfying the design and operating criterion of the transmission system, i.e. n-2 and n-1 respectively, entailed a restriction of the loading of the transmission lines and power transformers with regard to their loading capacity, thus leading to a reduction in thermal losses in power transmission.

(iv) The Transmission and Distribution Rules drawn-up by DSMK provide that applicant producers / consumers should be connected to the power transmission or distribution system on the basis of the capacity of their installation in MW/MVA, aiming at reducing thermal losses from the flow on the electricity system of the energy generated / consumed. Thus, the capacity limit for connection to the medium voltage system is set at 20 MW/MVA, beyond which connection to the high voltage system is mandatory.

(v) In addition to the thermal losses caused by the flow of active power on the transmission / distribution system, additional thermal losses are caused by the flow of reactive power generated / consumed from the point of generation / demand thereof to the power stations. Therefore, DSMK has promoted / adopted the following measures, aiming to reduce the distance and/or quantity of the reactive power flowing on the system:

- Installation of reactive power demand counterbalancing devices through capacitors in transmission substations, to reduce the feed-in distance of inductive reactive power of consumers, such as water pumps, summer air conditioners, etc.

- Installation of reactors in transmission substations in order, to counterbalance the inherent generation of excessive capacitive power of underground high-voltage electrical cabling during low-demand periods.

2. The following energy savings measures in the transport sector have been planned for the 2017-2020 period:

    - Further upgrading of the operating voltage of overhead lines and transmission substations from 66 kV to 132 kV.
    - Installation of additional devices to counterbalance reactive power.
    - Strengthening the penetration of RES in the distribution system.
    - Satisfaction of the n-2 and n-1 criterion for the purposes of the design and operation of the transmission system.

    As regards the result of the study provided for in Article 15(2), losses were measured of approximately 1.8 % on the transmission system and approximately 2.5 % on the distribution system. When compared to the international and European levels of 1-2.6 % for the transmission system and 2.3-13.4 % for the distribution system, these values are deemed to be satisfactory, with limited room for improvement.

3. By the date of completion of the 4th NEEAP, no information was available from CERA on Article 15 and on the tariffs and demand response of electricity and natural gas.

3.7.1 Savings resulting from all energy supply measures

1. By the date of completion of the 4th NEEAP, no information was available on energy savings from energy supply measures.

3.7.2 Financing of energy supply measures

1. By the date of completion of the 4th NEEAP, no information was available on the financing of energy supply measures.

ANNEX A: ANNUAL REPORT UNDER THE ENERGY EFFICIENCY DIRECTIVE

Article 24 (1) and Annex XIV Energy Efficiency Directive 2012/27/EU

Please, fill in the green fields (the grey ones are strongly recommended, but voluntary). It can be chosen if Eurostat data or data based on national statistics is provided. Please, fill in Table A if data from Eurostat is reported. In case, the data is based on national statistics, please, fill in Table B and provide definitions.

Annual Report	2017
Reporting year	2015
Member State	CYPRUS

Table A - Eurostat data

Number	Data field	AR Indicator	Unit(s)	Eurostat Indicator(s)	Eurostat database table	Eurostat Code	field/product(s)	SWD(2013)180, Annex A	Definition of provided national statistics for data fields not available in Eurostat	Last update (date of the data)
A1	2.2	(i) primary energy consumption	Mtoe	Primary Energy Consumption	Energy saving - annual data [nrg_ind_334a]	B_100910	-			15/02/2017
A2	1,659.50	(ii) total final energy consumption	ktoe	Final Energy Consumption	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101700	All products	No climate adjustment, see p. 39 SWD(2013)180, Annex A		27/01/2017
A3	201.1	(iii) final energy consumption - industry	ktoe	Final Energy Consumption - Industry	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101800	All products			27/01/2017
A4	867.4	(iii) final energy consumption - transport	ktoe	Final Energy Consumption - Transport	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101900	All products			27/01/2017
A5	0	final energy consumption in pipeline transport	ktoe	Consumption in Pipeline transport	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101945	All products	Voluntary - See p. 39 SWD(2013)180, Annex A		27/01/2017
A6	317.1	(iii) final energy consumption - households	ktoe	Residential	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102010	All products			27/01/2017

A7	214	(iii) final energy consumption - services	ktoe	Services	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102035	All products			27/01/2017
A8	41.7	final energy consumption - agriculture	ktoe	Agriculture/Forestry	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102030	All products	Voluntary		27/01/2017
A9	591.1	final energy consumption – other sectors	ktoe	Other sectors	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_102000	All products	Voluntary		27/01/2017
A10	1,545	(iv) gross value added - industry	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)	- Industry (except construction) - Construction	Gross value added and income by A*10 industry breakdowns [nama_10_a10]	- B-E - F	Value added, gross			07/04/2017
A11	11,792.10	(iv) gross value added - services	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)	- Wholesale and retail trade, transport, accommodation and food service activities - Information and communication - Financial and insurance activities - Real estate activities - Professional, scientific and technical activities; administrative and support service activities - Public administration,	Gross value added and income by A*10 industry breakdowns [nama_10_a10]	- G-I - J - K - L - M_N - O-Q - R-U	Value added, gross			07/04/2017

				defence, education, human health and social work activities - Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies					
A12	11,514	(v) disposable income for households	Million euro	Gross disposable income	Non-financial transactions [nasa_nf_tr]	Until 2017: S14 (if available) or S14_S15; From 2017 on: S14 only	"Households" (if available) or "Households; non-profit institutions serving households" (Until 2017)	Due to derogation for some MS granted by Eurostat	**Used EUROSTAT database table nasa_10_nf_tr.**	12/04/2017
A13	15,354.6	(vi) gross domestic product (GDP)	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)	Gross domestic product at market prices	GDP and main components - volumes [nama_gdp_k]	B1GM	-		**Data based on national statistics. Not available in EUROSTAT on 20/04/2017**	16/03/2017
A14	356.7	(vii) electricity generation from thermal power generation	ktoe	- Gross electricity generation Main activity electricity only - Nuclear- Gross electricity generation Main activity CHP plants - Nuclear- Gross electricity generation Autoproducer electricity only -	Supply, transformation, consumption - electricity - annual data [nrg_105a]	- 15_107030 - 15_107031 - 15_107032 - 15_107033 - 15_107038	Electrical energy			31/01/2017

				Nuclear- Gross electricity generation Autoproducer CHP plants - Nuclear- Gross electricity generation Main activity electricity only - Geothermal- Gross electricity generation Main activity electricity only - Combustible Fuels- Gross electricity generation Main activity electricity only - Other Sources- Gross electricity generation Main activity CHP plants - Geothermal- Gross electricity generation Main activity CHP plants - Combustible Fuels- Gross electricity generation Main activity CHP plants - Other Sources- Gross electricity generation Main activity electricity only - Solar Thermal- Gross electricity generation Autoproducer electricity only - Geothermal- Gross electricity generation Autoproducer electricity only - Combustible Fuels-		- 15_107048 - 15_107054 - 15_107039 - 15_107049 - 15_107055 - 14_1070422 - 15_107040 - 15_107050 - 15_107052 - 15_107056 - 15_107041 - 15_107051 - 15_107053 - 15_107057 - 14_1070432				

				Gross electricity generation Autoproducer electricity only - Heat from Chemical Sources- Gross electricity generation Autoproducer electricity only - Other Sources- Gross electricity generation Autoproducer CHP plants - Geothermal- Gross electricity generation Autoproducer CHP plants - Combustible Fuels- Gross electricity generation Autoproducer CHP plants - Heat from Chemical Sources- Gross electricity generation Autoproducer CHP plants - Other Sources- Gross electricity generation Autoproducer electricity only - Solar Thermal						
A15	4.4	(viii) electricity generation from CHP	ktoe	- Gross electricity generation Main activity CHP plants - Nuclear - Gross electricity generation Autoproducer CHP plants - Nuclear - Gross electricity generation Main activity CHP plants -	Supply, transformation, consumption - electricity - annual data [nrg_105a]	- 15_107031 - 15_107033 - 15_107039 - 15_107049	Electrical energy			31/01/2017

				Geothermal - Gross electricity generation Main activity CHP plants - Combustible Fuels - Gross electricity generation Main activity CHP plants - Other Sources - Gross electricity generation Autoproducer CHP plants - Geothermal - Gross electricity generation Autoproducer CHP plants - Combustible Fuels - Gross electricity generation Autoproducer CHP plants - Heat from Chemical Sources - Gross electricity generation Autoproducer CHP plants - Other Sources		- 15_107055 - 15_107041 - 15_107051 - 15_107053 - 15_107057				
A16	1.2	(ix) heat generation from thermal power generation	ktoe	- Gross heat production Main activity CHP plants - Nuclear - Gross heat production Main activity heat only plants - Nuclear - Gross heat production Autoproducer CHP plants - Nuclear - Gross heat production Autoproducer heat only plants - Nuclear - Gross heat production Main activity CHP plants –	Supply, transformation, consumption - heat - annual data [nrg_106a]	- 15_107060 - 15_107061 - 15_107062 - 15_107063 - 15_107064 - 15_107072 - 15_107076 -	Derived heat			06/02/2017

				Geothermal - Gross heat production Main activity CHP plants - Combustible Fuels - Gross heat production Main activity CHP plants - Heat Pumps - Gross heat production Main activity CHP plants - Electric Boilers - Gross heat production Main activity CHP plants - Other Sources - Gross heat production Main activity CHP plants - Solar - Gross heat production Autoproducer CHP plants - Geothermal - Gross heat production Autoproducer CHP plants - Combustible Fuels - Gross heat production Autoproducer CHP plants - Heat Pumps - Gross heat production Autoproducer CHP plants - Electric Boilers - Gross heat production Autoproducer CHP plants - Heat from Chemical Sources - Gross heat production Autoproducer CHP		15_107080 - 15_107086 - 15_107068 - 15_107066 - 15_107074 - 15_107078 - 15_107082 - 15_107084 - 15_107088 - 15_107070 - 15_107065 - 15_107069 - 15_107073 - 15_107077 - 15_107081 - 15_107087 - 15_107067 - 15_107071 - 15_107075 -				

				plants - Other Sources - Gross heat production Autoproducer CHP plants - Solar - Gross heat production Main activity heat only plants - Geothermal - Gross heat production Main activity heat only plants - Solar - Gross heat production Main activity heat only plants - Combustible Fuels - Gross heat production Main activity heat only plants - Heat Pumps - Gross heat production Main activity heat only plants - Electric Boilers - Gross heat production Main activity heat only plants - Other Sources - Gross heat production Autoproducer heat only plants - Geothermal - Gross heat production Autoproducer heat only plants - Solar - Gross heat production Autoproducer heat only plants - Combustible Fuels		15_107079 - 15_107083 - 15_107085 - 15_107089				

				- Gross heat production Autoproducer heat only plants - Heat Pumps - Gross heat production Autoproducer heat only plants - Electric Boilers - Gross heat production Autoproducer heat only plants - Heat from Chemical Sources - Gross heat production Autoproducer heat only plants - Other Sources						
A17		Waste heat produced in industrial installations	ktoe	Eurostat data not available. Please, provide national data with definitions/explanations in column J.				Voluntary - See p. 39 SWD(2013)180, Annex A		
A18	1.2	(x) heat generation from CHP	ktoe	- Gross heat production Main activity CHP plants - Nuclear - Gross heat production Autoproducer CHP plants - Nuclear - Gross heat production Main activity CHP plants - Geothermal - Gross heat production Main activity CHP plants - Combustible Fuels	Supply, transformation, consumption - heat - annual data [nrg_106a]	- 15_107060 - 15_107062 - 15_107064 - 15_107072 - 15_107076 - 15_107080 - 15_107086	Derived heat			06/02/2017

				- Gross heat production Main activity CHP plants - Heat Pumps - Gross heat production Main activity CHP plants - Electric Boilers - Gross heat production Main activity CHP plants - Other Sources - Gross heat production Main activity CHP plants - Solar - Gross heat production Autoproducer CHP plants - Geothermal - Gross heat production Autoproducer CHP plants - Combustible Fuels - Gross heat production Autoproducer CHP plants - Heat Pumps - Gross heat production Autoproducer CHP plants - Electric Boilers - Gross heat production Autoproducer CHP plants - Heat from Chemical Sources - Gross heat production Autoproducer CHP		- 15_107068 - 15_107066 - 15_107074 - 15_107078 - 15_107082 - 15_107084 - 15_107088 - 15_107070				

				plants - Other Sources - Gross heat production Autoproducer CHP plants - Solar						
A19	N/A	Waste heat recovered from industrial installations	ktoe	Eurostat data not available. Please, provide national data with definitions/explanations in column J.				Voluntary - See p. 39 SWD(2013)180, Annex A		
A20	920.4	(xi) fuel input for thermal power generation	ktoe	- Transformation input - Nuclear Power Stations - Transformation input - Conventional Thermal Power Stations - Transformation input - District Heating Plants	Supply, transformation, consumption - all products - annual data [nrg_100a]	- B_101002 - B_101001 - B_101009	All products			27/01/2017
A21	N/A	(xii) passenger kilometres	Millions of pkm	Railway TRA_COV: Total transport	Railway transport - Total annual passenger transport (1 000 pass., million pkm) [rail_pa_total]	- TOTAL	-		Not available National Data	01/12/2016
			Millions of pkm	Road VEHICLE: Total	Passenger road transport on national territory, by type of vehicles registered in the reporting country [road_pa_mov]	- TOTAL	-		Not available National Data	
A22	N/A	domestic maritime passenger kilometres	Millions of pkm	Eurostat data not available. Please, provide national data with					Not available National Data	01/12/2016

				definitions/explanations in column J.						
A23	N/A	total national aviation passenger kilometres	Millions of pkm	Eurostat data not available. Please, provide national data with definitions/explanations in column J.					Not available National Data	01/12/2016
A24	N/A	total international aviation passenger kilometres	Millions of pkm	Eurostat data not available. Please, provide national data with definitions/explanations in column J.					Not available National Data	01/12/2016
A25	**548.2**	(xiii) tonnes kilometres	Millions of tkm	Railway TRA_COV: Total transport	Railway transport - Goods transported, by type of transport (1 000 t, million tkm) [rail_go_typeall]	- TOTAL	-		Not applicable: No Railway Transport in Cyprus	01/12/2016
			Millions of tkm	Road TRA_OPER: Total - Total transport	Summary of annual road freight transport by type of operation and type of transport (1 000 t, Mio Tkm, Mio Veh-km) [road_go_ta_tot]	- TOTAL	CARRIAGE: Total			
			Millions of tkm	Waterway TRA_COV: Total transport	Transport by type of good (from 2007 onwards with NST2007) [iww_go_atygo]	- TOTAL	NSTO7: Total transported goods (TOTAL) TYPPACK: All types of packaging (TOTAL)		Not available National Data	
A26	N/A	domestic maritime tonnes kilometres	Millions of tkm	Eurostat data not available. Please, provide national data with					Not available National Data	01/12/2016

				definitions/explanations in column J.						
A27	N/A	total national aviation tonnes kilometres	Millions of tkm	Eurostat data not available. Please, provide national data with definitions/explanations in column J.					Not available National Data	01/12/2016
A28	N/A	total international aviation tonnes kilometres	Millions of tkm	Eurostat data not available. Please, provide national data with definitions/explanations in column J.					Not available National Data	01/12/2016
A29	848,319	xv) population	Persons	Population on 1 January - total	Demographic balance and crude rates [demo_gind]	JAN	-			07/04/2017
A30	313,000	Total number of households	Households	Eurostat data not available. Please, provide national data with definitions/explanations in column J.				Voluntary - see p. 39 SWD(2013)180, Annex A		30/11/2016
A31	18.5	Energy transmission and distribution losses (all fuels)	ktoe	Distribution Losses	Supply, transformation, consumption - all products - annual data [nrg_100a]	B_101400	All products	Voluntary - see p. 39 SWD(2013)180, Annex A		27/01/2017
A32	0	Heat generation from district heating plants	ktoe	Transformation output - District Heating Plants	Supply, transformation, consumption - heat - annual data [nrg_106a]	B_101109	Derived heat	Voluntary - see p. 39 SWD(2013)180, Annex A		06/02/2017
A33	0	Fuel input in district heating plants	ktoe	Transformation input - District Heating Plants	Supply, transformation, consumption - all	B_101009	All products	Voluntary - see p. 39 SWD(2013)180,		27/01/2017

					products - annual data [nrg_100a]			Annex A		

and/or
Table B - Data based on national statistics

Number	**Data field**	**AR Indicator**	**Unit**	**Source**	**SWD(2013)180, Annex A**	**Definition of provided national statistics (including differences respect the definitions of Eurostat indicators listed above)**	**Last update (date of the data)**
B1		(i) primary energy consumption	ktoe				
B2		(ii) total final energy consumption	ktoe		No climate adjustment, see p. 39 SWD(2013)180, Annex A		
B3		(iii) final energy consumption - industry	ktoe				
B4		(iii) final energy consumption - transport	ktoe				
B5		final energy consumption in pipeline transport	ktoe		Voluntary - See p. 39 SWD(2013)180, Annex A		
B6		(iii) final energy consumption - households	ktoe				
B7		(iii) final energy consumption - services	ktoe				
B8		final energy consumption - agriculture	ktoe		Voluntary		
B9		final energy consumption – other sectors	ktoe		Voluntary		
B10		(iv) gross value added - industry	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)				
B11		(iv) gross value added - services	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)				
B12		(v) disposable income for households	Million euro				

B13		(vi) gross domestic product (GDP)	Million euro, chain-linked volumes, reference year 2005 (at 2005 exchange rates)				
B14		(vii) electricity generation from thermal power generation	ktoe				
B15		(viii) electricity generation from CHP	ktoe				
B16		(ix) heat generation from thermal power generation	ktoe				
B17		Waste heat produced in industrial installations	ktoe		Voluntary - See p. 39 SWD(2013)180, Annex A		
B18		(x) heat generation from CHP	ktoe				
B19		Waste heat recovered from industrial installations	ktoe		Voluntary - See p. 39 SWD(2013)180, Annex A		
B20		(xi) fuel input for thermal power generation	ktoe				
B21		(xii) passenger kilometres	pkm				
B22		(xiii) tonnes kilometres	tkm				
B23		(xv) population	Persons				
B24		Total number of households	Households		Voluntary - see p. 39 SWD(2013)180, Annex A		
B25		Energy transmission and distribution losses (all fuels)	ktoe		Voluntary - see p. 39 SWD(2013)180, Annex A		
B26		Heat generation from district heating plants	ktoe		Voluntary - see p. 39 SWD(2013)180, Annex A		
B27		Fuel input in district heating plants	ktoe		Voluntary - see p. 39 SWD(2013)180, Annex A		

Additional requirements Article 24 (1), Annex XIV, Part 1 (a) Energy Efficiency Directive

In sectors where energy consumption remains stable or is growing, Member States shall analyse the reasons for it and attach their appraisal to the estimates.

Please, insert explanations or provide an extra/additional document:

34	Industry	-
35	Transport	The final energy consumption in the Transport Sector in 2015 (867.4 Ktoe) increased by 2.8% (24.5 Ktoe) in comparison with 2014(842.9 Ktoe). According to the Transport Statistics Report issued by Statistical Service of Cyprus in December 2016, the number of vehicles of all types and categories on the register of the Road Transport Department at the end of 2015 totalled 781.843 compared to 770.430 at the end of 2014. Therefore at the end of 2015 the number of vehicles increased by 11.413. In addition, according to the Energy Statistics of 2015, in 2015 the average Retail Market Prices of Motor Gasoline (Unleaded 98, Unleaded 95 and Gasoil Low Sulphur) decreased by 11.1% (Unleaded 98), 12.2% (Unleaded 95) and 13.7% (Gasoil Low Sulphur) respectively in comparison to 2014. Therefore, the combination of the increase of the total country's vehicle stock and the decrease of the Average Retail Market Prices of Motor Gasoline is the main reason of the increase of the final consumption in the transport sector in 2015.
36	Households	The final energy consumption in the Residential Sector in 2015 (317.1 Ktoe) increased by 8.6% (27.4 Ktoe) in comparison with 2014 (289.7 Ktoe). The increase in the final energy consumption is mainly due to: 1) in the climatic variations,2) in the decrease of the average Retail Market Price of electricity and petroleum products used in that sector (LPG and Gasoil) by 21.5% (electricity), 15.4% (LPG) and 18% (Gasoil) respectively in comparison to 2014.
37	Services	The final energy consumption in the Services Sector in 2015 (214 Ktoe) increased by 5.2% (11.2 Ktoe) in comparison with 2014 (202.8 Ktoe). The increase in the final energy consumption is mainly due to: 1) in the increase in tourist arrivals (218,000 more tourists visited Cyprus in 2015 in comparison with 2014), 2) in the climatic variations, 3) in the decrease of the average Retail Market Price of electricity and petroleum products used in that sector (LPG, Kerosene and Gasoil) by 22.1% (electricity), 15.4% (LPG), 19.5% (Kerosene) and 18% (Gasoil) respectively in comparison to 2014.
38	Agriculture (voluntary)	The final energy consumption in the Agriculture Sector in 2015 (41.7 Ktoe) increased by 11% (4.6 Ktoe) in comparison with 2014 (37.1 Ktoe). The increase in the final energy consumption is probably due to climatic variations, and/or in the increase of the production or/and in the in the decrease of Retail Market Price of Gasoil for Agriculture use in 2015 by 22% in comparison to 2014.

Additional requirements Article 24 (1), Annex XIV, Part 1 (b) Energy Efficiency Directive

Updates on major legislative and non-legislative measures implemented in the previous year which contribute towards the overall national energy efficiency targets for 2020:

		Type of measure	Legal basis	Type of update	Please, insert explanations or provide an extra/additional document:
39-1	Major legislative in the previous year	Decree	National	RAA 71/2016 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS AND ON THE ENERGY PERFORMANCE CERTIFICATE FOR BUILDINGS (AMENDING) DECREE OF 2016	
39-2		Decree	National	RAA 166/2016 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (CRITERIA TO BE SATISFIED BY A QUALIFIED EXPERTS EVALUATION ORGANISATION) DECREE OF 2016	
39-3		Decree	National	RAA 119/2016 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (MINIMUM ENERGY PERFORMANCE REQUIREMENTS) DECREE OF 2016	
39-4		Decree	National	RAA 231/2016 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (REQUIREMENTS ON NEW TECHNICAL BUILDING SYSTEMS IN EXISTING BUIDLINGS AND BUILDING UNITS AND ON TECHNICAL BUILDING SYSTEMS THAT ARE REPLACED OR UPGRATED) DECREE OF 2016	
39-5		Decree	National	RAA 379/2016 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (MINIMUM ENERGY PERFORMANCE REQUIREMENTS) (AMENDING) DECREE OF 2016	
39-6		Decree	National	RAA 321/2015 - THE REGULATION ON THE ENERGY PERFORMANCE OF BUILDINGS (AUTHORISED INSPECTORS) DECREE OF 2015	
39-7		Decree	National	RAA 420/2015 - THE REGULATION ON THE ENERGY PERFORMANCE OF BUILDINGS (REGULATION AND CONTROL OF AIR CONDITIONING SYSTEMS WITH A RATED OUTPUT POWER EXCEEDING 12 kW) DECREE OF 2015	
39-8		Decree	National	RAA 359/2015 - THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (MINIMUM ENERGY PERFORMANCE REQUIREMENTS) DECREE OF 2015	
39-9		Decree	National	RAA 344/2016- THE REGUALTION ON THE ENERGY PERFORMANCE OF BUILDINGS (ENERGY MANAGERS) DECREE OF 2016	

40-1	Major non-legislative in the previous year	Administrative	non-legislative	A support scheme was enacted for the energy renovation of existing houses and existing buildings owned or used by small and medium enterprises utilizing European and Structural Funds 2014-2020. The support scheme provides direct grants for the application of thermal insulation and other energy efficiency measures in buildings that will upgrade their energy class on the building's energy performance certificate to at least B or achieve energy saving of at least 40% or upgrade the building to the nearly zero energy level.	
40-2		Administrative	non-legislative	The "Technical Guide for Nearly Zero Energy Buildings" was prepared in order to assist buildings professionals in designing new buildings and renovating existing buildings to Nearly Zero Energy Buildings.	
40-3		Administrative	non-legislative	Information was provided to all energy consumers on energy efficiency related issues.	
40-4		Administrative	non-legislative	MECIT has approved educational training programs for energy auditors and provided licenses to energy auditors and energy services provider.	
40-5		Administrative	non-legislative	Energy poverty, vulnerable consumers' categories and measures to protect them were defined in a Ministerial Decree which entered into force in 14/9/2015. The Ministerial Decree includes measures such as (a) reduced prices on electricity tariffs, (b) financial incentives for participating in a scheme for installing a the net-metering Photovoltaic system with a capacity of up to 3kW, (c) financial incentives for upgrading the energy efficiency of their houses, and (d) uninterrupted supply of electricity, during critical periods for those vulnerable consumers that continuous power supply is essential for reasons related to their health	
40-6		Administrative	non-legislative	Support scheme "Solar Energy for All" which provides: (a) the installation of Net-metering photovoltaic systems with capacity up to 5KW connected to the grid for all consumers (residential and non-residential) and (b) the self-generation systems with capacity up to 10MW for commercial and industrial consumers.	
40-7		Administrative	non-legislative	Support scheme for the replacement of old solar domestic hot water heating systems.	
40-8		Administrative	non-legislative	The 6th annual competition for schools of secondary and technical education for projects/studies related to RES and energy saving has been held.	
40-9		Administrative	non-legislative	The Energy Service of MECIT continued the Energy Saving Officer's training program in the public sector. About 700 officers are assigned rented and government owned buildings	
40-10		Administrative	non-legislative	Ministry has organized workshops addressed mainly to architects and engineers to inform them about the technical parameters of these buildings and how to apply them	

			in practice.	
40-11	Administrative	non-legislative	Measures of market surveillance have been implemented and enforced in order to promote more energy efficient products and to ensure the proper functioning of the market.	

Additional requirements Article 24 (1), Annex XIV, Part 1 (c) Energy Efficiency Directive

41-1	Total building floor area [m2] of the buildings with a total useful floor area over 250 m2 owned and occupied by the Member States' central government	585,502 SQUARE METERS

Total building floor area of the buildings with a total useful floor area over 500 m2 and as of 9 July 2015 over 250 m2 owned and occupied by the Member States' central government that, on 1 January of the year in which the report is due, did not meet the energy performance requirements referred to in Article 5(1):

41-2	Total building floor area [m2] of the buildings which did not meet the energy performance requirements referred to in Article 5(1) on 1 January of the year in which the report is	582,282 SQUARE METERS

Additional requirements Article 24 (1), Annex XIV, Part 1 (d) Energy Efficiency Directive

Total building floor area of heated and/or cooled buildings owned and occupied by the Member States' central government that was renovated in the previous year referred to in Article 5(1) or the amount of energy savings in eligible buildings owned and occupied by their central government as referred to in Article 5(6):

42-1	Total building floor area [m2] of buildings renovated in the previous year as referred to in Article 5(6)	-
42-2	Amount of energy savings [ktoe] achieved in the previous year in eligible buildings owned and occupied by their central government as referred to in Article 5(6)	3.035GWh

Additional requirements Article 24 (1), Annex XIV, Part 1 (e) Energy Efficiency Directive

Energy savings achieved through the national energy efficiency obligation schemes referred to in Article 7(1) or the alternative measures adopted in application of Article 7(9):

	Policy measure (notified)	Savings achieved [ktoe] in 2015 (n-2)	Total expected savings [ktoe] by 2020 (voluntary)
43	EEOS	NA	NA
44	Photovoltaic systems - Net metering (3 Kw) - Grant Scheme. Household Sector	1.155	4.368
45	Photovoltaic systems - Net metering (3 Kw).Household Sector	3.804	15.416
46	Autoproduction using photovoltaic systems for commercial and industrial consumers.	0.431	1.759
47	Energy efficiency investments in public buildings (REPLACEMENT OF SPLIT UNITS IN THE PUBLIC SECTOR)	0.028	0.130
48	Energy efficiency investments in public building (NEW INSTALLATION OF SPLIT UNITS IN THE PUBLIC SECTOR)	0.030	0.132
49	Energy efficiency investments in public building (REPLACEMENT OF HEAT PUMP CHILERS/ VRV IN THE PUBLIC SECTOR)	0.137	0.549
50	Grant Scheme «Saving Energy – Upgrading of Households».	0.278	7.219
51	Grant Scheme «Saving Energy – Upgrading of Households» - vulnerable consumers	0.004	0.113
52	Grant Scheme «Saving Energy – Upgrading of Enterprises»	0.118	3.074
53	Soft measures (information campaigns, trainings, workshops, etc.)	0.495	0.495
54	Total savings	6.480	33.255

ANNEX B: RODMAPS ON THE RENOVATION OF BUILDINGS

1. The strategy for mobilising investment in the field of building renovation is included in Annex F.

ANNEX C: 2ND NATIONAL PLAN FOR INCREASING THE NUMBER OF NEARLY ZERO-ENERGY BUILDINGS (NZEBS)

2nd NATIONAL PLAN

FOR INCREASING THE NUMBER OF NEARLY ZERO-ENERGY BUILDINGS (NZEBs)

IN ACCORDANCE WITH ARTICLE 5A OF THE REGULATION OF THE ENERGY PERFORMANCE OF BUILDINGS LAWS OF 2006 TO 2017

MINISTRY OF ENERGY, COMMERCE,
INDUSTRY AND TOURISM

NEARLY ZERO-ENERGY BUILDINGS

CONTENTS

Chapter 1

INTRODUCTION

Directive 2010/31/EU on the energy performance of buildings sets out a number of measures aimed at utilising the large unused potential for energy savings in buildings. These also include a provision under which all new buildings must be nearly zero-energy buildings by 31 December 2020, whereas after 31 December 2018 all new buildings occupied or owned by public authorities must be nearly zero-energy buildings. This measure was transposed into national legislation by Article 5A of the Regulation on the Energy Performance of Buildings Law of 2012 (Law 210(I)/2012). Said Law states that the Minister for Energy, Commerce, Industry and Tourism may by Decree specify 'the requirements and technical characteristics to be met by nearly zero-energy buildings'.

'Nearly zero-energy building' means a building that has a very high energy performance, as determined in accordance with the methodology used to calculate the energy performance of buildings, in which the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

1.1 Energy policy and buildings

The indicative target set by Cyprus requires that the primary energy consumption in 2020 should not exceed 2.2 million tons of oil equivalent (TOE). Also, it is estimated on the basis of Article 7 of Directive 2012/27/EU on energy efficiency that end-use energy savings of 240 000 TOE should be ensured in the period 2014- 2020. Also, in accordance with Article 5 of the above Directive, energy savings of 3.3 GWh per year should be ensured in the period 2014-2020 in buildings used by central government authorities. Furthermore, Cyprus must ensure that the share of renewable energy sources (RES) in final energy consumption is at least 13 % by 2020. Directive 2009/28/EC on the promotion of the use of energy from renewable sources states: 'It will be incumbent upon Member States to make significant improvements in energy efficiency in all sectors in order more easily to achieve their targets for energy from renewable sources...'. Therefore, the improvement of the energy performance of buildings, including through the promotion of NZEBs, is deemed necessary to achieve the above targets, taking into account in particular that almost one third of the final energy consumption is due to the buildings.

1.2 Current state of play in terms of buildings

Introduction

In 2013, approximately 300 000 dwellings were used as permanent dwellings, broken down as follows: 120 000 detached houses, 65 000 terraced houses, 110 000 apartments and 8 000 other types of buildings (Zingheri, P. 2016). Forty per cent (40 %) of those dwellings were built before 1981 and fifty four per cent (54 %) were built between 1981 and 2006, i.e. before any minimum energy performance requirements were adopted (Zingheri, P. 2016). Therefore, a poor to medium energy performance rating can be assigned to most dwellings

Chapter 2

DEFINITION OF 'NEARLY ZERO-ENERGY BUILDING' (NZEB)

The Regulation on the Energy Performance of Buildings (Requirements and technical characteristics that must be met by a nearly zero-energy building) Decree of 2014 (RAA 366/2014) sets out the requirements that must be met by a building in order to be classified as NZEB. Before these requirements were determined, a study was prepared by an expert hired by the Ministry of Energy, Commerce, Industry and Tourism on the definition of NZEB in the residential sector. The study looked into the optimisation of the design parameters, construction materials, technical systems and renewable energy sources systems which would ensure the construction of a NZEB. Detached houses, multi-dwelling buildings and terraced houses were looked into, in the four meteorological areas of Cyprus. The financial aspect of NZEBs was also looked into from the building owner's perspective (EXERGIA SA, 2012).

A draft decree was prepared on the basis of that study and taking into account any NZEB designs available at the time. A public consultation followed, which was conducted through a public hearing and the two advisory committees: the advisory committee for the promotion of energy savings in buildings and the promotion of nearly zero-energy buildings and the advisory committee for following up on the implementation of the Regulation on the Energy Performance of Buildings Decrees, as adopted on the basis of the Regulation on the Energy Performance of Buildings Laws, in which all stakeholders are represented.

RAA 366/2014 was adopted on 1 August 2014, specifying the maximum permissible primary energy consumption and the minimum share of renewable energy sources in energy consumption. It also laid down more stringent requirements regarding thermal insulation levels compared to the minimum energy performance requirements currently in force for new buildings. As regards office buildings, there is a maximum permissible installed power in place to meet lighting needs.

Table 1

Requirements and technical characteristics that must be met by a nearly zero-energy building, as laid down in RAA 366/2014

	Requirements	
1	Energy efficiency class in the energy performance certificate of a building.	A
2	Maximum primary energy consumption in residential buildings, as determined in accordance with the methodology used to calculate the energy performance of buildings.	100 kWh per m^2 per year
3	Maximum primary energy consumption in non-residential buildings, as determined in accordance with the methodology used to calculate the energy performance of buildings.	125 kWh per m^2 per year
4	Maximum energy demand for heating for residential buildings.	15 kWh per m^2 per year
5	At least 25 % of total primary energy consumption, as determined in accordance with the methodology used to calculate the energy performance of buildings, comes from renewable energy sources.	
6	Maximum mean U-value for walls and load-carrying elements (pillars, beams and load-carrying walls) which are part of the building envelope.	0.4 W/m^2K
7	Maximum mean U-value for horizontal building elements (floors in a piloti, floors in a cantilever, terraces, roofs) and ceilings which are part of the building envelope.	0.4 W/m^2K
8	Maximum mean U-value for (door and window) frames which are part of the building envelope. Shop displays are exempted.	2.25 W/m^2K
9	Maximum mean installed lighting power for office buildings.	10 W/m^2

Adopting a definition of NZEB is deemed to be a significant measure for promoting these buildings, as it specifies the energy performance level for all new buildings after 2020, while at the same time providing all people currently engaged in the construction or renovation of buildings with a standard of increased energy efficiency in relation to the mandatory minimum energy performance requirements, which they may apply even now if they so wish.

Chapter 3

INTERMEDIATE TARGETS FOR IMPROVING THE ENERGY PERFORMANCE OF NEW BUILDINGS

The first attempt to adopt energy savings measures for buildings was made by adopting the CYS98:1999 national standard in 1999. In accordance with that standard, the U-value for opaque structures should be lower than 1 W/m2K. Conformity to the standard was optional. However, from 2004 to 2007, when the minimum energy performance requirements were adopted, conformity thereto was a precondition for aid to be granted under the energy savings measures by the Special Fund for RES and ES. The grant schemes of the Special Fund for RES and ES entered into force in February 2004, and an estimated EUR 67 million was granted as an economic incentive to implement energy savings and renewable energy measures in buildings, such as heat insulation, frames, energy efficient lighting, heat recovery, automation and RES systems in air conditioning and heating (Energy Service of the Ministry of Energy, Commerce, Industry and Tourism, 2014). The mandatory energy performance improvement of new buildings was adopted upon transposition of Directive 2002/91/EC on the energy performance of buildings and the setting of minimum energy performance requirements.

3.1 Developments in terms of minimum energy performance requirements for new buildings

The requirements for new buildings and building units are laid down in the Regulation on the Energy Performance of Buildings (Minimum energy performance requirements for buildings) Decree, as adopted by the Minister for Energy, Commerce, Industry and Tourism under Article 15(1) of the Regulation on the Energy Performance of Buildings Laws of 2006 to 2012 and published in the Cyprus Government Gazette. In adopting the Decree, the Minister consulted with the advisory committee for the promotion of energy savings in buildings and the promotion of nearly zero-energy buildings, as set up under the above Laws.

The first Minimum Energy Performance Requirements Decree, as adopted on 21 December 2007, laid down maximum permissible U-values for new buildings, thus making the thermal insulation of the building envelope and double glazing in external frames essentially mandatory.

As of 1 January 2010, an additional minimum energy performance requirement was added to the effect that all new buildings should be classified as a minimum under energy class B in the energy performance certificate. This fostered the application of better thermal insulation than that provided for by the requirements for individual building elements. Moreover, the installation of a solar hot water production system was made mandatory for all new dwellings, and the fitting of a standby installation for the use of renewable power systems was made mandatory for all new buildings.

By the Decree of 2013, the maximum U-values were reduced by approximately 15 %, while a maximum shade coefficient for windows was adopted for the first time. This coefficient is the product of the sunlight reduction factor by a fixed shade multiplied by the external movable shade and the sunlight transmission through the glazing. The Decree states that, in respect of buildings that are not used as residences, at least 3 % of total energy consumption must originate from renewable energy sources.

In 2016, the U-values for the building envelope were further reduced aiming to have the cost-benefit ratio over the lifecycle of the building reach its cost-optimal level, i.e. close to the NZEB requirements, as laid down in RAA 366/2014. The minimum percentage of total energy consumption that must originate from renewable sources was also increased significantly both for residential and non-residential buildings. The new minimum energy performance requirements entered into force on 1 January 2017 and are deemed to constitute the last and decisive step towards a smooth transition to NZEBs.

Developments in terms of minimum energy performance requirements for new buildings and building units, and comparison thereof against the NZEB requirements[1]

	Minimum Energy Performance Requirements Decree of 2007 (RAA 568/2007) In force since 21.12.2007	Minimum Energy Performance Requirements Decree of 2009 (RAA 446/2009) In force since 1.1.2010	Minimum Energy Performance Requirements Decree of 2013 (RAA 432/2013) In force since 11.12.2013	Minimum Energy Performance Requirements Decree of 2016 (RAA 119/2016 and RAA 379/2016) In force since 1.1.2017	NZEB requirements (RAA 366/2014)
Walls and load-carrying structure (maximum U-value)	0.85 W/m^{2}K	0.85 W/m^{2}K	0.72 W/m^{2}K	0.42 W/m^{2}K	0.4 W/m^{2}K
Roof and exposed floors (maximum U-value)	0.75 W/m^{2}K	0.75 W/m^{2}K	0.63 W/m^{2}K	0.4 W/m^{2}K	0.4 W/m2K
Door and window frames (maximum U-value)	3.8 W/m^{2}K	3.8 W/m^{2}K	3.23 W/m^{2}K	2.9 W/m^{2}K	2.25 W/m^{2}K
Maximum mean U-value for the building envelope, except for horizontal elements	-	1.3 W/m^{2}K for residential buildings 1.8 W/m^{2}K for non-residential buildings	1.3 W/m^{2}K for residential buildings 1.8 W/m^{2}K for non-residential buildings	-	-
Maximum shade coefficient for frames	-	-	0.63	0.63	-
Maximum mean installed lighting power for office buildings	-	-	-	10 W/m^2	10 W/m^2

[1] The Regulation on the Energy Performance of Buildings (Minimum energy performance requirements) Decree of 2015 (RAA 359/2015) was adopted on 30 October 2015. However, it did not modify the requirements set out in RAA 432/2013, but only repealed certain definitions.

[2] Alternatively, the U-value may reach 0.6 W/m2K, however, provided that the maximum mean U-value for frames does not exceed 2.5 W/m2K.

Renewable energy sources (RES)	-	Installation of a solar hot water production system in dwellings. Standby installation for the use of renewable power systems.	Installation of a solar hot water production system in dwellings. At least 3 % of total primary energy consumption must originate from RES in non-residential buildings.	At least 25 % of total primary energy consumption must originate from RES in detached houses. At least 3 % of total primary energy consumption must originate from RES in residential building units. At least 7 % of total primary energy consumption must originate from RES in non-residential buildings.	At least 25 % of total primary energy consumption must originate from RES in all buildings.
Minimum energy efficiency class in the energy performance certificate.	-	B	B	B	A
Maximum primary energy consumption, as determined in accordance with the methodology used to calculate the energy performance of buildings.	-	-	-	-	100 kWh per m^2 per year for residential buildings 125 kWh per m^2 per year for non-residential buildings
Maximum energy demand for heating for residential buildings.	-	-	-	-	15 kWh per m^2 per year

3.2 Cost-optimal levels of minimum energy performance requirements and NZEBs

The cost-optimal levels of minimum energy performance requirements were calculated in April 2013 in accordance with Article 5 of Directive 2010/31/EU (Ministry of Commerce, Industry and Energy, Tourism, 2013). The calculation aimed to find out whether the minimum energy performance requirements in force at the time (RAA 446/2009) were significantly different from the optimal levels and whether corrective action had to be taken. Considering the results of the calculation from the investor’s perspective and for the types of buildings for which calculations were made, i.e. detached houses, multi-dwelling buildings and offices, the main conclusions that can be reached for new buildings are (Ministry of Commerce, Industry and Energy, Tourism, 2013):

1. Energy class B is within cost-optimal levels.
2. Investing in lower U-values primarily for the roof and secondarily for the walls is the optimal way to reduce energy consumption.
3. A shading strategy appears to be significant for all types of buildings. However, cost-effectiveness may vary depending on the shading measure implemented.
4. In office buildings, energy consumption for lighting represents a major part of the energy consumption. Installing efficient lighting systems and, above all, making sure that these systems are correctly designed constitute an important measure given that the extra initial cost is relatively small for a new building.
5. Installing photovoltaic systems in conjunction with implementing energy savings measures is best practice that requires no subsidy, as it is combined with existing measures, i.e. net metering and autoproduction.

Based on the above conclusions, the minimum energy performance requirements were revised initially in 2013 (RAA 432/2013) and then in 2016 (RAA 119/2016).

Although NZEBs need not achieve cost-optimal levels, the calculation of cost-optimal levels of minimum energy performance requirements has allowed to look into the construction of NZEBs from the investor’s perspective. The results have shown that the NZEBs deviate from cost-optimal levels (i.e. the minimum energy performance requirements in force as of 1 January 2017), but they still have a significant economic value over the lifecycle of the building as compared to applying no requirements at all (Ministry of Commerce, Industry and Energy, Tourism, 2013).

The results of the calculation were based on the financial data of the period concerned, such as the energy costs, the construction costs and the discount rate. Given that these parameters are variable, the calculation must be repeated in 2018. The new calculation will trigger a review of the minimum energy performance requirements and will show whether they are in line with the requirements for NZEBs.

Chapter 4

POLICIES AND MEASURES FOR THE PROMOTION OF NZEBs IN NEW BUILDINGS AND BUILDINGS UNDERGOING MAJOR RENOVATION

NZEBs are a wholly new concept for professionals in the building industry as well as for building owners, both in terms of design and construction. It is true, therefore, that apart from the minimum energy performance requirements, further measures are also required to improve the skills of building designers and developers and to introduce NZEBs to the general public. Increasing NZEB-related knowledge and skills among professionals and consumers is encouraged through incentives, training measures, information measures and research programmes.

Incentives

Upon discontinuation of the grant schemes for the implementation of energy savings measures in buildings through the Special Fund for RES and ES in 2013, a new grant scheme was put in place in 2014 to encourage households and small and medium-sized enterprises (SMEs) to adopt energy efficiency and renewable energy measures. The ‘Save & Upgrade’ programme finances major renovation of dwellings and buildings owned or used by SMEs, which had requested a building permit before 21 December 2007, i.e. before the entry into force of the minimum energy performance requirements. The programme has a budget of EUR 15.3 million for the period 2014-2020 for SMEs and EUR 16.5 million for households and is co-financed by the European Regional Development Fund (ERDF) for SMEs or by the Union’s Cohesion Fund (CF) for households.

As opposed to the previous grant scheme individual for individual intervention measures, the new scheme provides financial support for a set of measures aimed to upgrade the building to a minimum energy efficiency level. The largest grant amount is granted to buildings undergoing renovation to become NZEBs, i.e. those that achieve conformity to RAA 366/2014. An estimated 106 existing dwellings will be upgraded to NZEBs from the date of the initial call issued under the ‘Save & Upgrade’ programme. On the basis of the assessment of the results of the first call to be issued by the Directorate-General for European Programmes, Coordination and Development, the plan will be revised and a second call will follow.

Another incentive is Order No 1 of 2014, as issued by the Minister for Interior on the basis of the Town and Country Planning Law. In accordance with the Order, in the case of new buildings and buildings undergoing renovation, it is possible to increase the building rate by 5 % for energy class A buildings, and at least 25 % of their total energy needs will be covered from renewable energy sources, i.e. at least two of the criteria laid down for NZEBs must be met. (Order No 1 of 2014: Use of renewable energy sources, in accordance with Article 6 of the Town and Country Planning Law.

To date, seventeen applications have been submitted to the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism to verify conformity to the requirements laid down in the Order. Most of the cases relate to new large buildings.

Information measures

The energy performance information available to building users and professionals in the building sector has significantly improved due to the measures taken in recent years, such as the minimum energy performance requirements and the energy performance certificates. However, NZEBs are a new topic for the construction industry, let alone for the general public.

In recognition of the fact that architects and engineers are responsible for the implementation of NZEBs, the Energy Service has issued a ‘Technical guide on nearly zero-energy buildings’. The guide aims to facilitate the project design team in looking into the most important NZEB design parameters. Plans are also being made to revise the ‘Guide on the thermal insulation of buildings’, which sets out the method used to calculate U-values and the specific heat capacity, also referring to thermal insulation techniques. The revision will include clear-cut references to NZEBs.

With regard to the general public, the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism has published an information leaflet, promoted both in hard copy and electronic format by the Energy Service as well as through other related stakeholders, such as the Technical Chamber of Cyprus and the Cyprus Energy Agency. In the context of its overall effort for more effective communication with the public, the Energy Service has been using the social media in order, among other things, to promote NZEBs, and is setting up a new website on NZEBs. At the same time, the Service is organising or participating in information workshops on NZEBs intended for specific target groups, such as consumer associations.

The Energy Service of the Ministry of Energy, Commerce, Industry and Tourism has secured technical assistance from the Joint Research Centre (JRC) including, among other things, proposals for providing consumers and stakeholders with information on NZEBs. There is also technical assistance obtained from the Gesellschaft für Internationale Zusammenarbeit (GIZ) for planning an information campaign on energy efficiency. The aim is to provide appropriate and timely information, adapted to each specific target group, such as households, undertakings, local authorities, etc. NZEBs are an integral part of that information campaign. The results of the study will be used as a criterion for the information measures to be implemented afterwards.

Training measures

Providing training on NZEBs to all professional groups involved in the construction industry and the real estate market is a fundamental measure for promoting NZEB principles in new and existing buildings.

The level of knowledge of engineers and architects regarding the energy performance of buildings has improved significantly thanks to the training and examination of qualified experts, heating system inspectors, air-conditioning system inspectors and energy auditors. In the effort made to integrate NZEBs in the field of knowledge of the independent experts concerned, the syllabus on which qualified experts are examined was modified in 2015 to include NZEB topics. Also, in the context of the training and examinations of energy auditors and heating system inspectors, reference is made to the legislative framework for NZEBs.

Moreover, in the context of the 'SouthZEB' research programme, the Department of Mechanical Engineering and Materials Science and Engineering of the Cyprus University of Technology organised a total of ten seminars under the general theme of NZEBs. The 'SouthZEB' programme aims to prepare engineers and architects engaging in the design of buildings for impending changes and building design as such, in South EU countries in particular (SOUTHZEB, n.d.). The Cyprus University of Technology has undertaken to train a small group of instructors, who will in turn be able to train other engineers/ architects in this respect. To date, there are 14 instructors who have trained 120 engineers and architects in NZEB design, 82 of whom were granted a certificate of successful attendance following an examination. The seminars are organised under the auspices of the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism.

The MENS project is financed by the EU Framework Programme Horizon2020, which aims to provide professionals in the building sector (architects, civil engineers, electrical engineers, etc.) with NZEB training, with the emphasis placed on the renovation of existing buildings. In particular, the MENS project aims to increase the NZEB-related knowledge and skills of 1 800 professionals in 10 countries, including Cyprus. 50 % of those persons should be women or unemployed. The 30-month-long project aims to set up an interdisciplinary training programme focusing on actual cases of buildings. The training activities of the project include a (postgraduate) university course, e-learning and webinars, as well as training meetings and workshops for the actual case study of buildings. Since January 2016, more than 60 persons have been trained in Cyprus and a total of more than 120 persons, all professionals in the building sector, were informed by taking part in project activities. The training course is available at the University of Cyprus. The Cypriot body responsible for the implementation of the 'MENS' project in Cyprus is the Research Centre for Sustainable Energy 'FOS' of the University of Cyprus.

Professionals engaging in the installation of building elements, technical systems and RES systems in buildings are also very important for the implementation NZEBs. According to the roadmap developed in the context of the ‘Build up skills – Pillar I’, there is a need to provide ‘green’ training to at least 4 500 workers for 13 different skills until 2020, to achieve the national targets for the energy efficiency of buildings (Build up skills, 2013). Having regard to the roadmap, the bodies responsible for the implementation of the project ‘WE-Qualify: Improve skills and qualifications in the building workforce relating to the energy performance of buildings’ completed the planning and trial implementation of five training courses for three different skills: (i) installation of thermal insulation, (ii) installation of frames and sunlight protection systems, and (iii) installation and maintenance of biomass systems. The main objective of the WE-Qualify project is to assist the construction sector in Cyprus to address the lack of skills among the workforce in relation to the construction of energy-efficient buildings, and to contribute towards the attainment of the targets for promoting renewable energy technologies.

The WE-Qualify project, which is co-financed by the ‘Intelligent Energy Europe’ programme through the ‘Build-up skills – Pillar II’ initiative, started its operations in November 2013 and was completed in October 2016. The following pilot training courses were implemented under the programme: three courses for thermal insulation installers, one course for frame and sunlight protection system installers, and one course for installers of small-scale biomass boilers and heaters.

As regards legislation and in the context of implementing Directive 2009/28/EC on the promotion of the use of energy from renewable sources, a certification system has been established for installers of small-scale RES systems carrying out the installation and/or maintenance of small-scale biomass boilers and heaters and/or photovoltaic and solar thermal systems and/or shallow geothermal systems and heat pumps. To date, a training provider for photovoltaic system installers and another one for installers of small-scale biomass boilers and heaters have been authorised. In addition to that, the Energy Service has, following consultation with the stakeholders, prepared regulations setting out the qualifications and obligations of installers of heating, air conditioning, major ventilation and hot water production systems. Both the existing arrangements and those planned aim to improve the skills of installers and, therefore, the quality of the installations in buildings, as this is essential in NZEBs.

Exemplary role of the public sector

Energy upgrade works have started since 2013 in buildings owned and used by the central government under the 'ENERGEIN' project. The project included the major renovation of two buildings and the implementation of individual energy savings and renewable energy measures in another two buildings. By virtue of the Decision of the Council of Ministers of 14 April 2016, a Committee was set up for upgrading the energy performance of buildings used by central government authorities, comprising representatives of the Department of Public Works, the Department of Electrical and Mechanical Services, the Directorate of Control of the Ministry of Transport, Communications and Works and the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism. The mandate given to the committee includes both the energy upgrading of existing buildings owned and used by the central public administration, with a view to complying with the obligation under Article 5 of Directive 2012/27/EU, and proposing measures to promote the NZEB principles in public buildings in a financially and technically optimal way. The committee should prepare an annual report to inform the Minister for Transport, Communications and Works and the Minister for Energy, Commerce, Industry and Tourism on the progress made in achieving the national target for energy savings in public buildings (excerpt from the minutes of the Council of Ministers meeting of 13 April 2016, Decision No 80 534).

NZEB research in Cyprus

Significant work has been carried out in recent years by universities and other research institutions in respect of NZEBs and, in particular, how the relevant principles can be implemented in an optimal way in Cyprus. The Energy Service supports such initiatives, mainly by issuing opinions on the policy implemented by the Republic of Cyprus in the energy sector, as well as on the dissemination of the results. Moreover, the results of these projects are also used as feedback to improve the existing NZEB arrangements and incentives. Following are some NZEB research projects, while we should also stress that other research programmes relating to the energy performance of buildings are being, or have been, implemented.

Efforts to secure research programmes are still being made by stakeholder organisations, and additional research projects may be implemented by 2020.

The European research project IEE EPISCOPE (Energy Performance Indicator Tracking Schemes for the Continuous Optimisation of Refurbishment Processes in European Housing Stocks) aims to consider the most effective methods for the energy upgrading of residential buildings, including scenarios for major renovation into NZEBs. Seventeen (17) Member States take part in the project, including Cyprus, its partner being the University of Cyprus (IEE Project EPISCOPE, n.d.).

The research project ‘Geothermal energy systems in NZEBs’ looked into the possibility of using a combination of a soil heat pump and photovoltaic systems in the Cypriot building sector from an energy, environmental and financial point of view, as well as on how these can contribute towards the achievement of NZEB targets. The project was implemented by the University of Cyprus and was financed by the Cyprus Research Promotion Foundation.

The project ‘Nearly Zero-Energy Sports Facilities – n0e Sport Facilities’ aims to assess the current state of play in terms of energy in 18 sports facilities in the EU and to determine and implement innovative technological solutions for energy savings, aiming to save more than 50 % of the current energy consumption. As a result, the ‘n0e sport facilities’ project promotes the creation of nearly zero-energy sports facilities through the design and the promotion of an integrated renovation package for sports facilities, including all the available energy savings methods/ measures and utilising renewable energy technologies. Three or four pilot sports facilities have been chosen in each country participating in the programme, to propose and implement energy efficiency improvement measures. The municipal swimming pool in Aglandjia, the sports facilities of the Chalkanoras Idaliou Club, the municipal swimming pool of Nicosia and the Sports Centre of Kition in Larnaca were chosen in Cyprus. The project is implemented in Cyprus by the Cyprus Energy Agency.

The ZERO-PLUS project is financed by Horizon 2020 and started on 1 October 2015, while it is expected to be completed by 30 September 2019. It consists in developing and implementing integrated energy-efficient agglomerations, including NZEBs. These agglomerations will be developed in four areas in Europe, one of them in Cyprus. The system will consist of innovative solutions for both the building envelope and the production and management of energy at building and agglomeration levels. The project aims to reduce the total use of energy by an average of 0-20kWh/m2 per year (compared to the current average of 70-230kWh/m2), as well as to migrate from NZEBs to nearly zero-energy agglomerations, in which energy loads and resources are optimally managed. Furthermore, 50kWh/m2 per year is expected to be produced from renewable energy sources by the use of innovative energy generation technologies. The aim is that the costs of the above system are reduced at least by 16 % compared to the current costs. The Cyprus Institute and Cyprus Vassiliou Ltd are the Cypriot participants in the project (concerning the ZERO-PLUS, n.d. project).

Chapter 5

ADDITIONAL INFORMATION

Other NZEB promotion measures are also taken and planned and, despite not being directly linked to NZEBs, contribute indirectly towards increasing the number of such buildings. Following is a list of the most important measures.

The 'Solar energy for all' programme started in 2013, aiming to promote photovoltaic installations for meeting own electricity needs. Up until the end of 2015, it was possible to install a photovoltaic system with a maximum capacity of 3kW in dwellings. In December 2015, the programme was revised to include all types of buildings and to increase the maximum permissible capacity of the photovoltaic system to 5kW. Where these systems are installed, the electricity consumed by the building is offset against that generated by the photovoltaic system (net metering). It is also possible to install larger photovoltaic systems (10kW to 10MW), in which case offsetting takes place every 20 minutes. The 'Solar energy for all' programme is a strong synergy for the promotion of NZEBs, as it helps fulfil the obligation for renewable energy production in the building. To date, more than 11 000 photovoltaic systems have been installed in buildings using the net metering method, and the aim is to have another 70MW installed by 2020, which corresponds to 15 000 buildings.

A significant development is the progress made in the field of energy audits and energy services. On the basis of regulations adopted in 2012, the training and authorisation of energy auditors started in the second half of 2013. Energy auditing offers a more integrated approach than that of the three other independent experts in the field of the energy performance of buildings (qualified experts, air-conditioning system inspectors and heating system inspectors), as it must be based on updated and measurable operating data regarding energy consumption in the building and must include a detailed overview of the characteristics of that consumption. This enables building owners and would-be investors to consider the energy upgrade options available, including renovation into NZEBs. Periodic energy audits are mandatory for large undertakings, as an energy audit must be carried out by 5 December 2015 and must be repeated every four years thereafter. As large undertakings represent only a small part of Cypriot undertakings, the number of energy audits to be carried out mainly depends on demand and supply on the market. The regulations on energy service providers (ESPs) were adopted in April 2014 to increase confidence in energy audits among stakeholders as well as in the alternative ways of financing energy savings measures resulting from energy audits, by means of energy performance contracting (EPC). To date, there are 61 energy auditors for buildings and 24 ESPs.

To further enhance energy efficiency in companies, and private and public organisations, the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism is promoting the institution of 'energy manager'. Energy management training has been provided to individuals since 2014 through the 'European Energy Managers' (EUREM) training programme. To further strengthen and disseminate energy management, the Energy Service prepared, following consultation with the stakeholders, a decree specifying the training and duties of energy managers. As provided for by the decree, an energy manager's duties include, among other things, proposing actions and making recommendations to an organisation's management for reducing energy consumption. This helps promote increased energy efficiency on a voluntary basis, also promoting NZEBs, through a company's, organisation's or government authority's own procedures too.

Choosing appropriate technical systems in a NZEB may entail a greater challenge than in a conventional building, as the needs to be met are relatively small and this has to be done in the most efficient manner without compromising comfort. To partially comply with Article 8 of Directive 2010/31/EU, the Energy Service has issued technical guides on energy performance requirements and the adjustment and control of the technical building systems which are installed in existing buildings. Despite the guides' primary aim being to lay down requirements for existing buildings only insofar as this is technically, functionally and economically feasible, they may also serve as standards of good practice, providing solutions for streamlined design, installation and use of technical systems in NZEBs.

Chapter 6

POTENTIAL IMPROVEMENTS

The current financial support policy for improving the energy performance of buildings and promoting NZEBs largely depends on State subsidisation. Please note that certain deficiencies in the previous grant scheme of the Special Fund for RES and ES are addressed in the 'Save & Upgrade' programme. For example, the 'Save & Upgrade' programme provides for major renovation financing, meaning that the buildings included in the current scheme are not at risk of 'blocking' the entire energy savings potential of the building. Furthermore, the provision for participation of the qualified experts and energy auditors in the scheme boosts energy efficiency in the market and promotes a holistic and cost-effective approach when measures are chosen for intervention in each building (Economidou, M. (2016), Financing energy efficiency in buildings in Cyprus - JRC Technical Report).

However, ensuring maximum investment requires a higher share of private financing and solutions that are based on market mechanisms. Therefore, NZEB projects must meet the different criteria that are mandatory for financing from the financial sector. Also, the banking sector must become acquainted with the concept of NZEBs and the economic parameters of the buildings. The technical report entitled 'Financing energy efficiency in Cyprus, Status across the EU and recommendations, JRC Reports', as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism, provides details on the existing financial incentives and assesses their financial and technical efficiency to date. A greater mobilisation of private capital is very important, also in line with said technical assistance, and proposals for improving the situation are being made. This parameter will be reconsidered in the impending restructuring of the 'Save & Upgrade' programme in view of the second call to be issued.

Events were also organised, where commercial banks were informed of matters relating to the energy performance of buildings both by the Energy Service and by professionals in the field. The aim is to intensify these contacts and the exchange of views in order to find solutions satisfying all stakeholders, including building owners.

To date, training and information on NZEBs are provided primarily to architects and engineers, as well as to installers to a lesser extent. However, a contribution can be made towards the promotion of NZEBs by other groups of professionals too, which are currently receiving no or very little information on the subject. The most important groups are real estate agents, property evaluators and construction material and technical system suppliers. The technical assistance received by the Ministry of Energy, Commerce, Industry and Tourism from the JRC and the GIZ is also expected to contribute towards finding appropriate communication channels for better informing these groups.

NZEBs require higher levels of thermal insulation and possibly, in many cases, the implementation of sunlight protection measures, such as external shades, cantilevers, etc. These measures tend to reduce the amount of usable space available in a building or the distance from adjacent buildings. As building construction is subject to town planning restrictions, discussing the issue with the direct stakeholders, i.e. the Department of Town Planning and Housing and architects, will stress the extent of the problem and point to the implementation of corrective measures as appropriate.

Conformity to the NZEB requirements laid down in RAA 366/2014 can only be achieved through the methodology used to calculate the energy performance of buildings. Various case studies and surveys have indicated that the actual energy consumption is lower than calculated, the largest deviation being observed in cooling. This is due to various reasons, the most important one being that the current methodology used to calculate the energy performance of buildings does not take into account measures that help reduce cooling needs, such as roof-mounted fans and a building design that favours natural cooling. The contribution of such measures towards reducing the energy spent on cooling cannot be calculated at this stage, as the calculation procedures concerned are not specified in the relevant EU standards. Moreover, EU standards do not allow for calculating the renewable energy derived from high-efficiency heat pumps. As a result, there are certain savings measures which are not adequately encouraged and it may be impossible to effectively implement an overall requirement concerning energy demand for cooling similar to that in place for heating. Cyprus looks forward to a solution to the problem through the new standards prepared by the European Committee for Standardisation (CEN).

ANNEXES

ANNEX A

The Regulation on the Energy Performance of Buildings (Requirements and technical characteristics that must be met by a nearly zero-energy building) Decree of 2014 (RAA 366/2014)

RAA 366/2014

GOVERNMENT GAZETTE
OF THE REPUBLIC OF CYPRUS

ANNEX III

PART I
REGULATORY ADMINISTRATIVE ACTS

Number 4806	**Friday, 1 August 2014**	**1475**

Number 366

THE REGULATION ON THE ENERGY PERFORMANCE OF BUILDINGS LAWS OF 2006 TO 2012

Decree under Articles 5A and 19(3)(g)

Preamble Official Journal of the EU: L153, 18.6.2010, P. 65.	To better transpose Article 9(2) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings,
142(I) of 2006 30 (I) of 2009 210(I) of 2012.	the Minister for Commerce, Industry and Tourism, exercising the powers conferred on him under Articles 5A and 19(3)(g) of the Regulation on the Energy Performance of Buildings Laws of 2006 to 2012, hereby adopts the following Decree.
Short title.	1. This Decree shall be referred to as the Regulation on the Energy Performance of Buildings (Requirements and technical characteristics that must be met by a nearly zero-energy building) Decree of 2014.
Interpretation.	2.-(1) In this Decree, unless the context requires otherwise:
	‘energy demand’ means the energy that a technical building system must provide to ensure indoor heating comfort conditions;
	‘maximum mean installed lighting power’ means the result of the calculation made by the method specified in the guide on heat insulation issued by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism;

‘maximum mean U-value for (door and window) frames which are part of the building envelope’ means the result of the calculation made by the method specified in the guide on heat insulation issued by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism;

‘maximum mean U-value for horizontal building elements (floors in a piloti, floors in a cantilever, terraces, roofs) and ceilings which are part of the building envelope’ means the result of the calculation made by the method specified in the guide on heat insulation issued by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism;

‘maximum mean U-value for walls and loading-carrying elements (pillars, beams and load-carrying walls) which are part of the building envelope’ means the result of the calculation made by the method specified in the guide on heat insulation issued by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism;

142(I) of 2006
30(I) of 2009
210(I) of 2012.

‘Law’ means the Energy Performance of Buildings Laws of 2006 to 2012.

(2) Any terms which are not specifically defined herein shall have the meaning ascribed to them by the law.

Requirements for zero-energy buildings.
Government Gazette, Annex Three (I): 11.12.2013
Table.

3. To classify a building as a nearly zero-energy building, it must conform to:

(a) the minimum energy performance requirements for buildings, as laid down in the Regulation on the Energy Performance of Buildings (Minimum energy performance requirements for buildings) Decree of 2013, as amended or replaced each time; and

(b) the requirements and technical characteristics laid down in the table, which are included in the national plans issued by the competent authority.

TABLE
(paragraph 3)

	Requirements	
1	Energy efficiency category in the Building Energy Performance Certificate	A
2	Maximum primary energy consumption in residential buildings, as determined in accordance with the methodology used to calculate the energy performance of buildings	100 kWh per square metre per year
3	Maximum primary energy consumption in non-residential buildings, as determined in accordance with the methodology used to calculate the energy performance of buildings	125 kWh per square metre per year
4	Maximum energy demand for heating in residential buildings	15 kWh per square metre per year
5	At least 25 % of total primary energy consumption, as determined in accordance with the methodology used to calculate the energy performance of buildings, comes from renewable energy sources	
6	Maximum mean U-value for walls and load-carrying elements (pillars, beams and load-carrying walls) which are part of the building envelope.	0.4 W/m^{2}K

7	Maximum mean U-value for horizontal building elements (floors in a piloti, floors in a cantilever, terraces, roofs) and ceilings which are part of the building envelope.	0.4 W/m^{2}K
8	Maximum mean U-value for (door and window) frames which are part of the building envelope. Shop displays are exempted.	2.25 W/m^{2}K
9	Maximum mean installed lighting power for office buildings.	10 W/m^2

Done on 23 July 2014.

Giorgos Lakkotrypis,
Minister for Energy, Commerce, Industry and Tourism.

ANNEX B

The most important measures taken to promote NZEBs between 2012 and 2015.

Measure	Type of measure	Year of implementation	Intended primarily for:
Study on the definition of NZEB for different types of homes (EXERGIA S.A., Provision of consulting services for the definition of Nearly Zero Energy Residential Buildings in Cyprus, Contract No MCIT/ES/01/2011, May 2012)	Search	2012	Ministry of Energy, Commerce, Industry and Tourism (Energy Service), building designers
Determination of the qualifications, training and the duties of energy auditors (RAA 184/2012)	Legislation/training	2012	Architects and engineers
Calculation of cost-optimal levels of minimum energy performance requirements (Ministry of Energy, Commerce, Industry and Tourism, Calculations for setting minimum energy performance requirements at cost optimum levels according to Article 5 of Directive 2010/31/EU on the energy performance of buildings (recast), April 2013)	Legislation/research	2013	Ministry of Energy, Commerce, Industry and Tourism (Energy Service)
‘Geothermal systems in NZEBs’ research project	Search	2013-2015	Architects and engineers
Renovation of buildings owned and used by central government authorities in the context of the ‘ENERGEIN’ project	Exemplary role of the public sector	2013-2015	Central government authorities, general public
‘Solar energy for all’ programme, to promote photovoltaic systems	Incentives	2013-2015	Owners of new and existing buildings
Revision of minimum energy performance requirements	Legislation	2013	All stakeholders

Measure	Type of measure	Year of implementation	Intended primarily for:
Increasing the building rate for energy efficiency class A buildings, which meet at least 25 % of energy consumption from RES	Incentives	2014-2020	Owners of new and existing buildings
Determination of the responsibilities of ESPs and of the procedure used for enrolment thereof in a register (RAA 210/2014)	Legislation	2014	Undertakings
Definition of NZEB by decree of the Minister for Energy, Commerce, Industry and Tourism (RAA 366/2014)	Legislation	2014	All stakeholders
Inclusion of NZEBs in the syllabus on which qualified experts are examined (RAA 419/2015)	Legislation/training	2015	Qualified experts
Determination of the qualifications, training and duties of small-scale RES system installers (RAA 374/2015)	Legislation/training	2015	RES installers
Technical guide on nearly zero-energy buildings	Information/training	2015	Building designers, qualified experts
'Save & Upgrade' programme for upgrading existing dwellings and buildings used by SMEs into NZEBs (first call)	Incentives	2015	Households and SMEs

ANNEX C

The most important measures already taken and planned to be taken to promote NZEBs between 2016 and 2020.

Measure	Type of measure	Year of implementation	Intended primarily for:
Document on NZEBs	Information	2016	General public
Revision of minimum energy performance requirements (RAA 119/2016)	Legislation	2016	All stakeholders
'Save & Upgrade' programme for upgrading existing dwellings and buildings used by SMEs into NZEBs (first call)	Incentives	2016	Households and SMEs
Revision of the 'Guide on the thermal insulation of buildings'	Legislation/information/training	2017	Building designers, qualified experts
Guide laying down requirements for technical systems installed or upgraded in residential buildings and building units, and guide laying down requirements for technical devices installed or upgraded in non-residential buildings or building units	Legislation/information/training	2016	For technical building system designers and installers
Website of the Energy Service concerning NZEBs	Information	2017	General public
Determination of the qualifications, training and duties of technical building system installers	Legislation/training	2017	Technical system installers
Determination of the training and the duties of energy managers	Legislation/training	2016	Executives of undertakings and public organisations
EPISCOPE research programme	Search	2013-2016	Ministry of Energy, Commerce, Industry and Tourism (Energy Service), architects and engineers

Measure	Type of measure	Year of implementation	Intended primarily for:
'WE QUALIFY' project	Training	2013-2016	Installers of building envelope elements, technical systems and RES
'Nearly Zero Energy Sports Facilities' research programme	Search	2014-2016	Sports facility owners and managers, such as local authorities and sports clubs
'SouthZEB' project	Training / research	2015-2017	Building designers
'MENS' project	Training / research	2016-2017	Building designers, qualified experts
Renovation of buildings owned and used by central government authorities in the context of applying Article 5 of Directive 2012/27/EU	Exemplary role of the public sector	2016-2020	Central government authorities, general public
'Save & Upgrade' programme for upgrading existing dwellings and buildings used by SMEs into NZEBs (second call)	Incentives	2017-2020	Households and SMEs
Second calculation of cost-optimal levels of minimum energy performance requirements	Legislation/research	2018	Ministry of Energy, Commerce, Industry and Tourism (Energy Service)
Review and revision of minimum energy performance requirements	Legislation	2018-2020	All stakeholders
'ZERO-PLUS' research project	Search	2015-2019	Architects and engineers

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ANNEX D: DESCRIPTION OF MEASURES AND TABLES ON CALCULATIONS

1. Minimum energy performance requirements for new buildings (Law 142/2006)

1.1. Residential sector

Title of the energy efficiency improvement measure (EEI).		All new dwellings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006) must satisfy the minimum energy performance requirements established by a relevant decree adopted by the Minister for Commerce, Industry and Tourism.
	Timeframe	Start: 2008, Expiry: - These codes, which have been in force since 2008, were revised in 2010 and 2013, whereas another revision thereof is expected before 2020.
	Purpose / short description	This measure arises from Cyprus' obligation to implement the Buildings Directive concerning the energy performance of new buildings. The purpose of the measure is described in the wider purpose of applying the Directive concerned.
	End use category	Residential buildings (dwellings-apartments)
	Target group	New dwellings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)2006)
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	• The Regulation of Streets and Buildings Law 101(I)/2006 • The Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006 • The Streets and Buildings (Performance of Buildings) Regulations (RAA 429/2006)
	Budget and source	Not applicable
	Implementing organisation	Energy Service of MECIT.
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	National methodology. Described in Annex E paragraph 1.
	Final energy savings achieved in 2016.	**97 275.2 TOE**
	Primary energy savings achieved in 2016.	**67 696.9 TOE**
	Expected primary energy savings in 2020	**67 696.9 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	In calculating energy savings, data were obtained from the Statistical Service concerning the floor area of the dwellings-apartments built in 2008-2014. Due to the lack of available data for 2015 and 2016, it was assumed that they were the same as for 2014 plus a 10 % increase. The assumptions are included in the methodology described in Annex E paragraph 1.

TABLES LISTING DATA ON ENERGY EFFICIENCY CALCULATIONS FOR THE ENERGY EFFICIENCY OF NEW DWELLINGS.

New Single family house							
Total Primary Consumption before Buildings Code (kWh/year)	**Primary Consumption before Buildings Code in (kWh/m²/year)**	**Total Energy Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Total Energy Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/year)**	**Primary Energy Saving (kWh/m²/year)**	**Final Consumption before Building Codes in (kWh/m²/year)**	**Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Final Energy Saving (kWh/m²/year)**
39882	226.60	21431.696	121.771	104.83	123.4	66.7	56.7

Year of Construction	**Area of new single houses constructed (m²)**	**Energy Saving (kWh/m²/year)**	**Total Energy Saving per year (kWh/year)**	**Total Primary Energy Saving per year (toe/year)**	**Total Final Energy Saving per year (toe/year)**	Life time	**CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION**		**CONTRIBUTION TOWARDS THE PRIMARY CONSUMPTION TARGET (2020)**	
							toe	**%**	**toe**	**%**
2008	550000	90.00	49500000	4257.0	2680.4	20	4257.0	2.301%	0.0	0.000%
2009	1325779	90.00	119320110	10261.5	6461.1	20	10261.5	5.547%	0.0	0.000%
2010	1167883	104.83	122430661	10529.0	5691.6	20	10529.0	5.691%	10529.0	2.808%
2011	970505	104.83	101739274	8749.6	4729.7	20	8749.6	4.730%	8749.6	2.333%
2012	723201	104.83	75814081	6520.0	3524.5	20	6520.0	3.524%	6520.0	1.739%
2013	510902	104.83	53558507	4606.0	2489.8	20	4606.0	2.490%	4606.0	1.228%
2014	324865	104.83	34056011	2928.8	1583.2	20	2928.8	1.583%	2928.8	0.781%
2015	357352	104.83	37461613	3221.7	1741.5	20	3221.7	1.741%	3221.7	0.859%
2016	393087	104.83	41207774	3543.9	1915.7	20	3543.9	1.916%	3543.9	0.945%
2017	0	0.00	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2018	0	0.00	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2019	0	0.00	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2020	0	0.00	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
TOTAL	5773573		585588031.6	50360.6	28137.1		54617.6	27.222%	40099.0	10.693%

Please note that an estimate of the floor area was made for 2015 and 2016 due to the lack of available data as of drafting of the NEEAP.

New Apartments						
Total Primary Consumption before Buildings Code (kWh/year)	Primary Consumption before Buildings Code in (kWh/m²/year)	Energy Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/year)	Primary Energy Saving (kWh/m²/year)	Final Consumption before Building Codes in (kWh/m²/year)	Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)	Final Energy Saving (kWh/m²/year)
23990.01	272.61	150.218106	122.40	161.96	76.36	85.60

Year of Construction	Area of new apartments constructed (m²)	Energy Saving (kWh/m²/year)	Total Energy Saving per year (kWh/year)	Total primary Energy Saving per year (toe/year)	Total Final Energy Saving per year (toe/year)	Life time	CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION		CONTRIBUTION TOWARDS THE PRIMARY CONSUMPTION TARGET (2020)	
							toe	%	toe	%
2008	455000	105.00	47775000	4108.7	3349.6	20	4108.7	2.221%	0.0	0.000%
2009	1212750	105.00	127338750	10951.1	8928.1	20	10951.1	5.920%	0.0	0.000%
2010	931209	122.40	113975922.1	9801.9	6855.4	20	9801.9	5.298%	9801.9	2.614%
2011	613886	122.40	75136970.25	6461.8	4519.3	20	6461.8	3.493%	6461.8	1.723%
2012	431091	122.40	52763659.12	4537.7	3173.6	20	4537.7	2.453%	4537.7	1.210%
2013	215214	122.40	26341255.41	2265.3	1584.4	20	2265.3	1.225%	2265.3	0.604%
2014	130051	122.40	15917675.46	1368.9	957.4	20	1368.9	0.740%	1368.9	0.365%
2015	143056	122.40	17509443.01	1505.8	1053.2	20	1505.8	0.814%	1505.8	0.402%
2016	157362	122.40	19260387.31	1656.4	1158.5	20	1656.4	0.895%	1656.4	0.442%
2017	0	0.00	0	0.0	0.0	20	0	0.000%	0.0	0.000%
2018	0	0.00	0	0.0	0.0	20	0	0.000%	0.0	0.000%
2019	0	0.00	0	0.0	0.0	20	0	0.000%	0.0	0.000%
2020	0	0.00	0	0.0	0.0	20	0	0.000%	0.0	0.000%
TOTAL	3834619		448244062.7	42657.6			42657.6	23.058%	27597.9	7.359%

Please note that an estimate of the floor area was made for 2015 and 2016 due to the lack of available data as of drafting of the NEEAP. .

RESIDENTIAL SECTOR- New Single family house & New Apartments

Year of Construction	Area of new buildings (single houses, apartments, offices) constructed (m²)	Total Energy Saving per year (kWh/year)	Total primary Energy Saving per year (toe/year)	Life time	Total Final Energy Saving per year (toe/year)	CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION		CONTRIBUTION TOWARDS THE PRIMARY CONSUMPTION TARGET (2020)	
						toe	%	toe	%
2008	1005000	97275000	8365.65	20	6030	8365.65	4.52%	0.00	0.00%
2009	2538529	246658860	21212.66	20	15389	21212.66	11.47%	0.00	0.00%
2010	2099092	236406583.4	20330.97	20	12547	20330.97	10.99%	20331.0	5.42%
2011	1584391	176876244.6	15211.36	20	9249	15211.36	8.22%	15211.4	4.06%
2012	1154292	128577740.4	11057.69	20	6698	11057.69	5.98%	11057.7	2.95%
2013	726116	79899762.31	6871.38	20	4074	6871.38	3.71%	6871.4	1.83%
2014	454916	49973686.88	4297.74	20	2541	4297.74	2.32%	4297.7	1.15%
2015	500408	54971055.56	4727.51	20	2795	4727.51	2.56%	4727.5	1.26%
2016	550448	60468161.12	5200.26	20	3074	5200.26	2.81%	5200.3	1.39%
2017	0	0	0.00	20	0	0	0.00%	0.00	0.00%
2018	0	0	0.00	20	0	0	0.00%	0.00	0.00%
2019	0	0	0.00	20	0	0	0.00%	0.00	0.00%
2020	0	0	0.00	20	0	0	0.00%	0.00	0.00%
TOTAL	10613192	1131107094	97275.21			97275	52.581%	67696.90	18.053%

1.2. Tertiary sector

Title of the energy efficiency improvement measure (EEI).		All new tertiary sector buildings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006) must satisfy the minimum energy performance requirements established by a relevant decree adopted by the Minister for Commerce, Industry and Tourism.
Description	**Timeframe**	Start: 2008, Expiry: These codes, which have been in force since 2008, were revised in 2010 and 2013, whereas another revision thereof is expected before 2020.
	Purpose / short description	This measure arises from Cyprus' obligation to implement the Buildings Directive concerning the energy performance of buildings. The purpose of the measure is described in the wider purpose of applying the Directive concerned.
	End use category	Tertiary sector buildings
	Target group	New tertiary sector buildings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)2006)
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	• The Regulation of Streets and Buildings Law 101(I)/2006 • The Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006 • The Streets and Buildings (Performance of Buildings) Regulations (RAA 429/2006)
	Budget and source	Not applicable
	Implementing organisation	Energy Service of MECIT.
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	National methodology. Described in paragraph 2 of Annex E.
	Final energy savings achieved in 2016.	**11 152.3 TOE**
	Primary energy savings achieved in 2016.	**9 024.7 TOE**
	Expected primary energy savings in 2020	**9 024.7 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	In calculating energy savings, data were obtained from the Statistical Service concerning the floor area of the dwellings-apartments built in 2008-2014. Due to the lack of available data for 2015 and 2016, it was assumed that they were the same as for 2014 plus a 10 % increase. The assumptions are included in the methodology described in Annex E paragraph 2.

TABLES LISTING DATA ON ENERGY EFFICIENCY CALCULATIONS FOR THE ENERGY EFFICIENCY OF NEW TERTIARY SECTOR BUILDINGS.

Offices							
Total Primary Consumption before Buildings Code (kWh/year)	**Primary Consumption before Buildings Code in (kWh/m^2/year)**	**Total Energy Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Total Energy Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m^2/year)**	**Primary Energy Saving (kWh/m^2/year)**	**Final Consumption before Building Codes in (kWh/m^2/year)**	**Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Final Energy Saving (kWh/m^2/year)**
645994	256.86	31724.352	180.252	76.60	95.13	66.76	28.37

Year of Construction	Area of new offices constructed (m^2)	Energy Saving (kWh/m^2/year)	Total Energy Saving per year (kWh/year)	Total primary Energy Saving per year (toe/year)	Total Final Energy Saving per year (toe/year)	Life time	CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION		CONTRIBUTION TOWARDS THE PRIMARY CONSUMPTION TARGET (2020)	
							toe	%	toe	%
2009	322949	76.60	24739352	2127.6	788.0	20	2127.6	1.150%	0.0	0.000%
2010	290292	76.60	22237687	1912.4	708.3	20	1912.4	1.034%	1912.4	0.510%
2011	301130	76.60	23067866	1983.8	734.8	20	1983.8	1.072%	1983.8	0.529%
2012	207512	76.60	15896361	1367.1	506.3	20	1367.1	0.739%	1367.1	0.365%
2013	157001	76.60	12026964	1034.3	383.1	20	1034.3	0.559%	1034.3	0.276%
2014	125058	76.60	9580029	823.9	305.1	20	823.9	0.445%	823.9	0.220%
2015	137564	76.60	10538031	906.3	335.7	20	906.3	0.490%	906.3	0.242%
2016	151321	76.60	11591835	996.9	369.2	20	996.9	0.539%	996.9	0.266%
2017	0	76.60	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2018	0	76.60	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2019	0	76.60	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
2020	0	76.60	0	0.0	0.0	20	0.0	0.000%	0.0	0.000%
TOTAL	1692827		129678124	11152.3	4130.5		11152.3	4.878%	9024.7	2.407%

Please note that an estimate of the floor area was made for 2015 and 2016 due to the lack of available data as of drafting of the NEEAP.

2. Grant scheme encouraging the use of RES

2.1. RESIDENTIAL SECTOR.

Title of the energy efficiency improvement measure (EEI).		Grant scheme encouraging the use of RES (end use) in the residential sector.
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant and/or subsidy for implementing investments to encourage the use of renewable energy sources (RES). The scheme covers investments consisting in purchasing and installing new equipment. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. The measure aims to foster RES in the residential sector, increase RES awareness among ordinary people and contribute towards RES and energy savings targets.
	End use category	Residential sector buildings
	Target group	1. Natural persons, insofar as they do not carry out an economic activity and live permanently in areas under the control of the Republic of Cyprus. 2. Organisations which provide services to society as a whole and other services of a social or individual nature (school boards, charitable institutions, monasteries, churches, municipalities, communities, State agencies, etc.) which are active in areas under the control of the Republic of Cyprus, insofar as they do not carry out an economic activity.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	• Autonomous photovoltaic systems • Household solar systems • Solar space heating/cooling • Central active solar water heating systems • Solar swimming pool water heating systems • Heat pump with ground heat exchanger for space heating and cooling
	Budget and source	See Annex G Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.

<table>
<tr><td rowspan="6">Energy savings</td><td>Method used for monitoring/calculating energy savings.</td><td>In calculating energy savings for each type of investment, the methodologies described in Annex E paragraph 3 were used.</td></tr>
<tr><td>Final energy savings achieved in 2016.</td><td>12 734.4 TOE</td></tr>
<tr><td>Primary energy savings achieved in 2016.</td><td>987.2 TOE</td></tr>
<tr><td>Expected primary energy savings in 2020</td><td>987.2 TOE</td></tr>
<tr><td>Contribution towards the target referred to in Article 7 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td>Contribution towards the target referred to in Article 5 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td></td><td>Assumptions</td><td>
<table>
<tr><th>Investment category</th><th>Number of systems</th></tr>
<tr><td>Autonomous photovoltaic systems</td><td>379</td></tr>
<tr><td>Household solar systems</td><td>41 521</td></tr>
<tr><td>Solar space heating/cooling</td><td>813</td></tr>
<tr><td>Central active solar water heating systems</td><td>48</td></tr>
<tr><td>Solar swimming pool water heating systems</td><td>51</td></tr>
<tr><td>Heat pump with ground heat exchanger for space heating and cooling</td><td>110</td></tr>
<tr><td>TOTAL</td><td>42 922</td></tr>
</table>
Other assumptions are included in the methodology described in Annex E paragraph 3.</td></tr>
</table>

TABLES LISTING DATA ON INVESTMENTS MADE UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE RESIDENTIAL SECTOR

AUTONOMOUS PHOTOVOLTAIC SYSTEMS - RESIDENTIAL SECTOR								
No	YEAR	DURATION OF INVESTMENT (YEARS)	NUMBER OF INVESTMENTS	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016) TOE	%	ENERGY SAVINGS TOWARDS THE TARGET FOR 2020 TOE	%
1	2005	20	4	1.62	1.62	0.001 %	0.00	0.003 %
2	2006	20	28	10.94	10.94	0.006 %	0.00	0.002 %
3	2007	20	33	11.69	11.69	0.006 %	0.00	0.005 %
4	2008	20	64	23.26	23.26	0.013 %	0.00	0.003 %
5	2009	20	73	18.21	18.21	0.010 %	0.00	0.000 %
6	2010	20	46	12.44	12.44	0.007 %	12.44	0.003 %
7	2011	20	37	8.00	8.00	0.004 %	8.00	0.002 %
8	2012	20	54	20.23	20.23	0.011 %	20.23	0.005 %
9	2013	20	40	10.91	10.91	0.006 %	10.91	0.003 %
10	2014	20	0	0.00	0.0	0.000 %	0.00	0.000 %
TOTAL			379	117.30	117.3	0.063 %	51.58	0.014 %

DOMESTIC SOLAR HOT WATER SYSTEMS								
No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016) TOE	%	ENERGY SAVINGS TOWARDS THE TARGET FOR 2020 TOE	%
1	2004	1 879	20	395.54	395.54	0.23 %	395.54	0.00 %
2	2005	4 978	20	1 307.69	1 307.69	0.76%	1 307.69	0.00 %
3	2006	6 941	20	1 641.85	1 641.85	0.96 %	1 641.85	0.00 %
4	2007	10 706	20	3 111.45	3 111.45	1.82 %	3 111.45	0.00 %
5	2008	15 272	20	4 603.44	4 603.44	2.69 %	4 603.44	0.00 %
6	2009	0	20	0.00	0.00	0.00 %	0.00	0.00 %
7	2010	314	20	102.87	102.87	0.06 %	102.87	0.03 %
8	2011	256	20	80.34	80.34	0.05 %	80.34	0.02 %
9	2012	658	20	207.38	207.38	0.12 %	207.38	0.06 %
10	2013	517	20	164.09	164.09	0.09 %	164.09	0.04 %
TOTAL		41 521			11 614.65	6.28 %	554.68	0.15 %

RESIDENTIAL SECTOR - HOT WATER PRODUCED BY SOLAR COLLECTORS FOR SPACE HEATING AND/OR COOLING								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**DURATION OF INVESTMENT (YEARS)**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	**2004**	12	**20**	11.32	11.32	0.006 %	0.00	0.000 %
2	**2005**	10	**20**	7.11	7.11	0.004 %	0.00	0.000 %
3	**2006**	42	**20**	39.59	39.59	0.021 %	0.00	0.000 %
4	**2007**	83	**20**	73.00	73.00	0.039 %	0.00	0.000 %
5	**2008**	162	**20**	149.52	149.52	0.081 %	0.00	0.000 %
6	**2009**	124	**20**	95.89	95.89	0.052 %	0.00	0.000 %
7	**2010**	190	**20**	156.28	156.28	0.084 %	156.28	0.042 %
8	**2011**	153	**20**	100.37	100.37	0.054 %	100.37	0.027 %
9	**2012**	34	**20**	25.50	25.50	0.014 %	25.50	0.007 %
10	**2013**	3	**20**	2.57	2.57	0.001 %	2.57	0.001 %
TOTAL		**813**		**661.14**	**661.14**	**0.357 %**	**284.71**	**0.076 %**

RESIDENTIAL SECTOR - CENTRAL ACTIVE SOLAR HOT WATER PRODUCTION SYSTEMS								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**DURATION OF INVESTMENT (YEARS)**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	**2004**	1	**20**	1.19	1.2	0.001 %	0.0	0.000 %
2	**2005**	4	**20**	9.77	9.8	0.005 %	0.0	0.000 %
3	**2006**	3	**20**	6.24	6.2	0.003 %	0.0	0.000 %
4	**2007**	1	**20**	0.63	0.6	0.000 %	0.0	0.000 %
5	**2008**	10	**20**	6.81	6.8	0.004 %	0.0	0.000 %
6	**2009**	14	**20**	11.95	11.9	0.006 %	0.0	0.000 %
7	**2010**	9	**20**	8.56	8.6	0.005 %	8.6	0.002 %
8	**2011**	6	**20**	6.96	7.0	0.004 %	7.0	0.002 %
9	**2012**	0	**20**	0.00	0.0	0.000 %	0.0	0.000 %
TOTAL		**48**		**52.10**	**52.10**	**0.028 %**	**15.52**	**0.004 %**

RESIDENTIAL SECTOR - SWIMMING POOL WATER HEATING BY THE USE OF SOLAR COLLECTORS								
No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2004	2	20	3.57	3.6	0.002 %	0.0	0.00 %
2	2005	5	20	5.27	5.3	0.003 %	0.0	0.00 %
3	2006	1	20	1.44	1.4	0.001 %	0.0	0.00 %
4	2007	19	20	13.90	13.9	0.008 %	0.0	0.00 %
5	2008	24	20	16.40	16.4	0.009 %	0.0	0.00 %
TOTAL		51		20	40.6	0.022 %	0.0	0.00 %

RESIDENTIAL SECTOR - Heat pump with ground heat exchanger for space heating and cooling								
No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2006	12	20	19.89	19.9	0.011 %	0.00	0.00
2	2007	12	20	27.53	27.5	0.015 %	0.00	0.00
3	2008	15	20	48.28	48.3	0.026 %	0.00	0.00
4	2009	45	20	61.71	72.2	0.039 %	0.00	0.00
5	2010	23	20	74.94	77.7	0.042 %	77.7	0.021 %
6	2011	3	20	2.93	3.0	0.002 %	3.0	0.001 %
TOTAL		110		248.62	248.62	0.1344 %	80.69	0.022 %

Please note that only investments implemented after 31 December 2009 contribute towards the target for 2020.

2.2 TERTIARY SECTOR

Title of the energy efficiency improvement measure (EEI).		Grant scheme encouraging the use of RES (end use) in the tertiary sector
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant and/or subsidy for implementing investments to encourage the use of renewable energy sources (RES). The scheme covers investments consisting in purchasing and installing new equipment. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. This measure aims firstly to increase energy savings awareness in the business sector and secondly to have that sector contribute towards savings targets.
	End use category	Tertiary sector
	Target group	Tertiary sector buildings The following categories of investors may apply: 1. Natural and legal persons, insofar as they do not carry out an economic activity. 2. Public sector bodies carrying out an economic activity.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Autonomous photovoltaic systems • Solar space heating/cooling • Central active solar water heating systems • Solar swimming pool water heating systems. • Heat pump with ground heat exchanger for space heating and cooling
	Budget and source	See Annex G Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	Provision of the scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings determined by each individual study and confirmed by the Cyprus Institute of Energy was used to determine the final energy savings declared below. The methodologies described in Annex E paragraph 4 were used for the calculations.

	Final energy savings achieved in 2016.	**1 133.4 TOE**
	Primary energy savings achieved in 2016.	**84.5 TOE**
	Expected primary energy savings in 2020	**84.5 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	A total of 160 investments were implemented under all the subcategories of this category during the implementation of the measure. The numbers of systems implemented per subcategory are detailed below: (see table below) Other assumptions are included in the methodologies described in Annex E paragraph 4.

Investment category	**Number of systems**
Autonomous photovoltaic systems	11
Solar space heating/cooling	26
Central active solar water heating systems	111
Solar swimming pool water heating systems.	9
Heat pump with ground heat exchanger for space heating and cooling	3

TABLES LISTING DATA ON INVESTMENTS MADE UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE TERTIARY SECTOR

AUTONOMOUS PHOTOVOLTAIC SYSTEMS - TERTIARY SECTOR								
No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2005	0.00	20	0.00	0.00	0.000 %	0.0	0.000 %
2	2006	1.00	20	0.17	0.17	0.000 %	0.0	0.000 %
3	2007	1.00	20	0.18	0.18	0.000 %	0.0	0.000 %
4	2008	3.00	20	1.15	1.15	0.001 %	0.0	0.000 %
5	2009	2.00	20	2.65	2.65	0.001 %	0.0	0.000 %
6	2010	3.00	20	0.51	0.51	0.000 %	0.51	0.0001 %
7	2011	1.00	20	1.57	1.57	0.001 %	1.57	0.0004 %
8	2012	0.00	20	0.00	0.00	0.000 %	0.00	0.0000 %
9	2013	0.00	20	0.00	0.00	0.000 %	0.00	0.0000 %
10	2014	0.00	20	0.00	0.00	0.000 %	0.00	0.0000 %
TOTAL		11		6.23	6.23	0.003 %	2.08	0.0006 %

TERTIARY SECTOR - HOT WATER PRODUCED BY SOLAR COLLECTORS FOR SPACE HEATING AND/OR COOLING								
No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2004	1	20	1.93	1.93	0.001 %	0.00	0.000 %
2	2005	0	20	0.00	0.00	0.000 %	0.00	0.000 %
3	2006	1	20	4.56	4.56	0.002 %	0.00	0.000 %
4	2007	3	20	10.99	10.99	0.006 %	0.00	0.000 %
5	2008	6	20	23.82	23.82	0.013 %	0.00	0.000 %
6	2009	8	20	15.92	15.92	0.009 %	0.00	0.000 %
7	2010	1	20	8.49	8.49	0.005 %	8.49	0.002 %
8	2011	3	20	4.22	4.22	0.002 %	4.22	0.001 %
9	2012	3	20	6.79	6.79	0.004 %	6.79	0.002 %
10	2013	0	20	0.00	0.00	0.000 %	0.00	0.000 %
TOTAL		26		76.73	76.73	0.041 %	19.50	0.005 %

TERTIARY SECTOR - CENTRAL ACTIVE SOLAR HOT WATER PRODUCTION SYSTEMS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2004	17	20	66.56	66.56	0.036 %	0.0	0.000 %
2	2005	29	20	85.10	85.10	0.046 %	0.0	0.000 %
3	2006	8	20	12.10	12.10	0.007 %	0.0	0.000 %
4	2007	12	20	37.78	37.78	0.020 %	0.0	0.000 %
5	2008	13	20	22.07	22.07	0.012 %	0.0	0.000 %
6	2009	14	20	66.12	66.12	0.036 %	0.0	0.000 %
7	2010	8	20	20.18	20.18	0.011 %	20.2	0.005 %
8	2011	8	20	27.77	27.77	0.015 %	27.8	0.007 %
9	2012	2	20	14.93	14.93	0.008 %	14.9	0.004 %
TOTAL		**111**		**352.62**	**352.62**	**0.191 %**	**62.9**	**0.017 %**

TERTIARY SECTOR - SWIMMING POOL WATER HEATING BY THE USE OF SOLAR COLLECTORS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2004	4	20	17.78	17.8	0.010 %	0.0	0.00 %
2	2005	2	20	11.74	11.7	0.006 %	0.0	0.00 %
3	2007	2	20	1.74	1.7	0.001 %	0.0	0.00 %
4	2008	1	20	1.18	1.2	0.001 %	0.0	0.00 %
TOTAL		**9**		**32.43**	**32.4**	**0.018 %**	**0.0**	**0.00 %**

TERTIARY SECTOR - HEAT PUMP WITH GROUND HEAT EXCHANGER FOR SPACE HEATING AND COOLING

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2006	0	20	0.0	0.0	0.00 %	0.000	0.000
2	2007	0	20	0.0	0.0	0.00 %	0.000	0.000
3	2008	1	20	494.1	494.1	0.27 %	0.000	0.000
4	2009	2	20	171.3	171.3	0.09 %	0.000	0.000
5	2010	0	20	0.0	0.0	0.00 %	0.000	0.000
6	2011	0	20	0.0	0.0	0.00 %	0.000	0.000
TOTAL		**3**		**665.41**	**665.41**	**0.36 %**	**0.000**	**0.000**

Please note that only investments implemented after 31 December 2009 contribute towards the target for 2020.

2.3 INDUSTRY - AGRICULTURAL SECTOR

<table>
<tr><td colspan="2">Title of the energy efficiency improvement measure (EEI).</td><td>Grant scheme encouraging the use of RES (end use) in the industry sector and in agriculture.</td></tr>
<tr><td>Description</td><td>Timeframe</td><td>Start: 2004, Expiry: 2013</td></tr>
<tr><td></td><td>Purpose / short description</td><td>The scheme aims to provide economic incentives in the form of a State grant and/or subsidy for implementing investments to encourage the use of renewable energy sources (RES). The scheme covers investments consisting in purchasing and installing new equipment. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage.
This measure aims firstly to increase energy savings awareness in the industry sector and secondly to have that sector contribute towards savings targets.</td></tr>
<tr><td></td><td>End use category</td><td>Industry sector</td></tr>
<tr><td></td><td>Target group</td><td>Existing buildings in the industry sector
The following categories of investors may apply:
1. Natural and legal persons, insofar as they do not carry out an economic activity.
2. Public sector bodies carrying out an economic activity</td></tr>
<tr><td></td><td>Area of application</td><td>All of Cyprus</td></tr>
<tr><td rowspan="4">Information concerning implementation</td><td>List and description of actions for measure verification.</td><td>This category relates to investments implemented in industry and agriculture in the following subcategories:
<table>
<tr><th>Investment category</th></tr>
<tr><td>Autonomous photovoltaic systems</td></tr>
<tr><td>Autonomous photovoltaic systems for lighting purposes.</td></tr>
<tr><td>Solar space heating/cooling</td></tr>
<tr><td>Central active solar water heating systems</td></tr>
</table></td></tr>
<tr><td>Budget and source</td><td>See Annex G
Special Fund for RES and ES</td></tr>
<tr><td>Implementing organisation</td><td>Special Fund for RES and ES</td></tr>
<tr><td>Competent monitoring authority</td><td>Energy Service of MECIT.</td></tr>
</table>

<table>
<tr><td rowspan="6">Energy savings</td><td>Method used for monitoring/ calculating energy savings.</td><td>Provision of the scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings determined by each individual study, confirmed by the Cyprus Institute of Energy and used to determine the final energy savings declared below. The methodologies described in Annex E paragraph 5 were used.</td></tr>
<tr><td>Final energy savings achieved in 2016.</td><td>29.1 TOE</td></tr>
<tr><td>Primary energy savings achieved in 2016.</td><td>5.6 TOE</td></tr>
<tr><td>Expected primary energy savings in 2020</td><td>5.6 TOE</td></tr>
<tr><td>Contribution towards the target referred to in Article 7 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td>Contribution towards the target referred to in Article 5 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td></td><td>Assumptions</td><td>A total of 54 investments were implemented during the implementation of the measure. The types of investments are detailed below:
<table>
<tr><th>Investment category</th><th>Number of systems</th></tr>
<tr><td>INDUSTRY</td><td></td></tr>
<tr><td>Solar space heating/cooling</td><td>1</td></tr>
<tr><td>Central active solar water heating systems</td><td>6</td></tr>
<tr><td>AGRICULTURE</td><td></td></tr>
<tr><td>Autonomous photovoltaic systems</td><td>36</td></tr>
<tr><td>LIGHTING</td><td></td></tr>
<tr><td>Autonomous photovoltaic systems</td><td>11</td></tr>
</table>
The assumptions are included in the methodologies described in Annex E paragraph 5.</td></tr>
</table>

TABLES LISTING DATA ON INVESTMENTS MADE UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE INDUSTRY SECTOR

INDUSTRY SECTOR - HOT WATER PRODUCED BY SOLAR COLLECTORS FOR SPACE HEATING AND/OR COOLING

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	**2005**	1	**20**	9.54	9.5	0.005 %	0.00	0.000 %
TOTAL		**1**		**9.54**	**9.54**	**0.005 %**	**0.00**	**0.000 %**

INDUSTRY SECTOR - CENTRAL ACTIVE SOLAR HOT WATER PRODUCTION SYSTEMS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	**2006**	2	**20**	1.73	1.7	0.001 %	0.0	0.000 %
2	**2007**	2	**20**	2.63	2.6	0.001 %	0.0	0.000 %
3	**2008**	1	**20**	0.68	0.7	0.000 %	0.0	0.000 %
4	**2009**	1	**20**	0.48	0.5	0.000 %	0.0	0.000 %
TOTAL		**6**		**5.52**	**5.52**	**0.003 %**	**0.0**	**0.000 %**

AUTONOMOUS PHOTOVOLTAIC SYSTEMS - AGRICULTURAL SECTOR

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
2	**2006**	2	**20**	0.37	0.37	0.000 %	0.0	0.000 %
3	**2007**	3	**20**	0.82	0.82	0.000 %	0.0	0.000 %
4	**2008**	12	**20**	3.88	3.88	0.000 %	0.0	0.000 %
5	**2009**	9	**20**	3.29	3.29	0.002 %	0.0	0.000 %
6	**2010**	1	**20**	0.18	0.18	0.002 %	0.18	0.000 %
7	**2011**	4	**20**	2.84	2.84	0.000 %	2.84	0.001 %
8	**2012**	2	**20**	0.48	0.48	0.002 %	0.48	0.000 %
9	**2013**	3	**20**	0.69	0.69	0.000 %	0.69	0.000 %
TOTAL		**36**		**12.55**	**12.55**	**0.007 %**	**4.19**	**0.001 %**

AUTONOMOUS PHOTOVOLTAIC SYSTEMS - LIGHTING

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
7	**2011**	1	**20**	0.13	0.13	0.000 %	0.13	0.0000 %
8	**2012**	10	**20**	1.32	1.32	0.001 %	1.32	0.0004 %
TOTAL		**11**		**1.45**	**1.45**	**0.001 %**	**1.45**	**0.0004 %**

3. Energy savings scheme.

3.1. Residential sector.

Title of the energy efficiency improvement measure (EEI).		Energy savings grant scheme in the residential sector (existing dwellings).
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant for implementing energy savings (ES) investments. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers investments consisting in purchasing and installing new materials. The investments should relate to mature technologies/materials, exclusive of ones that are at a research and development stage. Upon application of new thermal insulation materials, the relevant U-values must be achieved, as laid down in the Minimum Energy Performance Requirements Decree. This measure aims firstly to have thermal insulation installed in as many existing or new homes constructed prior to the entry into force of the legislation on the mandatory thermal insulation of new dwellings as possible and secondly to increase energy savings awareness among people.
	End use category	Residential sector buildings
	Target group	Existing dwellings
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Thermal insulation (walls) Thermal insulation (windows) Thermal insulation (roofs)
	Budget and source	EUR 33 882 837 (concerning all the above subcategories) Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	The national methodology described in Annex E paragraph 6 was used.
	Final energy savings achieved in 2016.	**10 526.70 TOE** Information on the savings contributed by each thermal insulation subcategory is provided in the tables below.
	Primary energy savings achieved in 2016.	**1 093.90 TOE** Information on the savings contributed by each thermal insulation subcategory is provided in the tables below.
	Expected primary energy	**1 093.90 TOE**

	savings in 2020	Information on the savings contributed by each thermal insulation subcategory is provided in the tables below.
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	A total of 26 982 investments were implemented under the above subcategories during the implementation of the measure. The investments under each subcategory are detailed below: **Investment category** / **Number of investments** Thermal insulation of walls: 2 224 Thermal insulation of windows: 22 074 Thermal insulation of roofs: 3 632 The assumptions are included in the methodology described in Annex E paragraph 6.

Investment category	**Number of investments**
Thermal insulation of walls	2 224
Thermal insulation of windows	22 074
Thermal insulation of roofs	3 632

TABLES LISTING DATA ON INVESTMENTS MADE UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE TERTIARY SECTOR

RESIDENTIAL SECTOR - THERMAL INSULATION OF WINDOWS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%		
1	2004	96	30	20.51	20.51	0.01 %	-	-
2	2005	545	30	124.07	124.07	0.07 %	-	-
3	2006	4 540	30	1 121.48	1 121.48	0.61%	-	-
4	2007	4 722	30	1 085.39	1 085.39	0.59 %	-	-
5	2008	7 257	30	1 629.82	1 629.82	0.88 %	-	-
6	2009	4 708	30	1 059.88	1 059.88	0.57 %	-	-
7	2010	0	30	0.00	0.00	0.00 %	0.00	0.00 %
8	2011	112	30	26.00	26.00	0.01 %	26.00	0.01 %
9	2012	91	30	14.14	14.14	0.01 %	14.14	0.00 %
10	2013	3	30	0.44	0.44	0.00 %	0.44	0.00 %
TOTAL		22 074		5 081.73	5 081.73	2.75 %	40.58	0.011 %

RESIDENTIAL SECTOR - THERMAL INSULATION OF ROOFS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2004	12	25	13.54	13.54	0.01 %	-	-
2	2005	71	25	84.07	84.07	0.05 %	-	-
3	2006	609	25	774.78	774.78	0.42 %	-	-
4	2007	635	25	764.22	764.22	0.41 %	-	-
5	2008	979	25	1 157.90	1 157.90	0.63 %	-	-
6	2009	633	25	749.42	749.42	0.41 %	-	-
7	2010	0	25	0.00	0.00	0.00 %	0.00	0.00 %
8	2011	121	25	187.99	187.99	0.10 %	187.99	0.05 %
9	2012	207	25	311.95	311.95	0.17 %	311.95	0.08 %
10	2013	366	25	539.77	539.77	0.29 %	539.77	0.14 %
TOTAL		3 632		4 583.64	4 583.64	2.48 %	1 039.70	0.28 %

RESIDENTIAL SECTOR - THERMAL INSULATION OF WALLS

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT (YEARS)	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	**2004**	8	**30**	2.79	2.79	0.00 %	-	-
2	**2005**	55	**30**	20.65	20.65	0.01 %	-	-
3	**2006**	452	**30**	189.51	189.51	0.10 %	-	-
4	**2007**	471	**30**	182.98	182.98	0.10 %	-	-
5	**2008**	721	**30**	273.82	273.82	0.15 %	-	-
6	**2009**	469	**30**	178.00	178.00	0.10 %	-	-
7	**2010**	0	**30**	0.00	0.00	0.00 %	0.00	0.00 %
8	**2011**	18	**30**	5.43	5.43	0.00 %	5.43	0.001 %
9	**2012**	29	**30**	7.37	7.37	0.00 %	7.37	0.002 %
10	**2013**	1	**30**	0.79	0.79	0.00 %	0.79	0.000 %
TOTAL		**2 224**		**861.34**	**861.34**	**0.47 %**	**13.60**	**0.004 %**

RESIDENTIAL SECTOR - OVERALL THERMAL INSULATION

No	YEAR	NUMBER OF INVESTMENTS	GRANT AMOUNT	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	**2004**	116	EUR 33 882 837	36.84	36.84	0.02 %	-	-
2	**2005**	671		228.80	228.80	0.12 %	-	-
3	**2006**	5 601		2 085.77	2 085.77	1.13 %	-	-
4	**2007**	5 828		2 032.59	2 032.59	1.10 %	-	-
5	**2008**	8 957		3 061.53	3 061.53	1.65 %	-	-
6	**2009**	5 810		1 987.29	1 987.29	1.07 %	-	-
7	**2010**	0		0.00	0.00	0.00 %	0.00	0.00 %
8	**2011**	251		219.42	219.42	0.12 %	219.42	0.06 %
9	**2012**	327		333.46	333.46	0.18 %	333.46	0.09 %
10	**2013**	370		541.00	541.00	0.29 %	541.00	0.14 %
TOTAL		**27 930**	**EUR 33 882 837**	**10 526.70**	**10 526.70**	5.69 %	**1 093.88**	**0.29 %**

3.2. Public and broader public sector.

Title of the energy efficiency improvement measure (EEI).		State energy savings / RES grant scheme for the public or broader public sector.
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant and/or subsidy or a special grant for implementing energy savings (ES) investments and encouraging the use of renewable energy sources (RES). The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers investments consisting in purchasing and installing new equipment and/or materials. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. The measure aims to promote RES and ES in the public and broader public sector, to increase RES and ES awareness among civil servants and to contribute towards RES and ES targets.
	End use category	Public sector
	Target group	Buildings in the public and broader public sector
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Decision of the Council of Ministers No 64825, 2007.
	Budget and source	EUR 37 908.10 The information was provided by the Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings.	**Method used for monitoring/ calculating energy savings.**	Provision of the scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings determined by each individual study and confirmed by the Cyprus Institute of Energy was used to determine the final energy savings declared below. The methodologies described in Annex E paragraph 7 were used.
	Final energy savings achieved in 2016.	**96.6 TOE**
	Primary energy savings achieved in 2016.	**0 TOE**
	Expected primary energy	**0 TOE**

	savings in 2020	
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	Three (3) investments were implemented during the implementation of the measure.

Type of investment	**Number of investments**
LED LAMPS	1
THERMAL INSULATION OF ROOFS	1
REPLACEMENT OF SINGLE GLAZING WITH DOUBLE GLAZING	1

TABLES LISTING DATA ON INVESTMENTS IMPLEMENTED UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE PUBLIC SECTOR

TERTIARY SECTOR - ENERGY SAVINGS IN THE PUBLIC AND BROADER PUBLIC SECTOR FROM THE ENERGY SAVINGS GRANT SCHEME

No	**YEAR**	**NUMBER OF INVESTMENTS**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
				TOE	**%**	**TOE**	**%**
1	2004	1	5.08	5.08	0.00 %	0.00	0.00 %
2	2008	2	91.55	91.55	0.05 %	0.00	0.00 %
TOTAL		3	96.63	96.63	0.05 %	0.00	0.00 %

3.3 Tertiary sector.

Title of the energy efficiency improvement measure (EEI).		Energy savings grant scheme (end use) in the residential sector (existing undertakings).
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant or special subsidy for implementing energy savings (ES) investments. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers investments consisting in purchasing and installing new equipment and/or materials. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. ‘Energy savings investment’ means investment in systems, equipment and materials whose installation achieves at least 10 % energy savings in a specific application. The maximum grant amount that could be given depending on the type of investment and the form of the eligible grant (regional, de minimis / special subsidy) stood at EUR 250 000 per facility. This measure aims firstly to increase energy savings awareness in the business sector and secondly to have that sector contribute towards savings targets.
	End use category	Tertiary sector (undertakings)
	Target group	Tertiary sector buildings The following categories of investors may apply: 1. Natural and legal persons, insofar as they do not carry out an economic activity. 2. Public sector bodies carrying out an economic activity.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	This category relates to investments falling under the following subcategories: Purchase / installation of new equipment for the recovery of waste energy, either directly or indirectly by recovery / recycling of discarded materials, product or employed medium. Purchase / integration of new materials and equipment to reduce reactive power consumption and power losses. Purchase / integration of new equipment for the production, transmission, distribution and use of energy. Purchase/installation of a new energy management computer system and/or integration of automated direct energy regulation/switch-off devices. Replacement of existing materials and/or equipment relating to the subcategories
	Budget and source	EUR 4 384 647.01 Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	Provision of the scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings determined by each individual study and confirmed by the Cyprus Institute of Energy was used to determine the final energy savings declared below. The methodologies described in Annex E paragraph 8 were used.

	Final energy savings achieved in 2016.	**9 042 TOE**
	Primary energy savings achieved in 2016.	**715.1 TOE**
	Expected primary energy savings in 2020	**715.1 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	A total of 370 investments were implemented under this category during the implementation of the measure. Some types of investment implemented are: ELEC-SAVER, POWER PLANNER, INVERTERS, THERMAL INSULATION OF ROOF / BUILDING, Electro Flow, EMS, HEAT RECOVERY SYSTEM, Chillers, BMS, economizers, replacement of glazing, replacement of lamps. Please note that those of the above investments which are not effective under any of the energy savings targets (depending on the year of implementation) are not included in these targets.

TABLES LISTING DATA ON INVESTMENTS IMPLEMENTED UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE TERTIARY SECTOR

TERTIARY SECTOR - ENERGY SAVINGS IN UNDERTAKINGS								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**GRANT AMOUNT**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	2004	31	EUR 145 127.81	343 165	152.47	0.08 %	0	0.000 %
2	2005	34	EUR 187 207.40	496 595	297.86	0.16 %	0	0.000 %
3	2006	45	EUR 321 181.04	258 777	213.71	0.12 %	0.00	0.000 %
4	2007	58	EUR 563 296.00	2 808 129	2 700.80	1.46 %	0.00	0.000 %
5	2008	86	EUR 1 037 216.00	2 693 396	2 663.90	1.44 %	0.00	0.000 %
6	2009	74	EUR 1 681 526.76	2 342.423	2 298.24	1.24 %	0.00	0.000 %
7	2010	0	EUR -	0.000	0.00	0.00 %	581.90	0.000 %
8	2011	19	EUR 322 693.00	581 904	581.90	0.31 %	112.22	0.155 %
9	2012	23	EUR 84 369.00	112 222	112.22	0.06 %	20.93	0.030 %
10	2013	1	EUR 42 030.00	20 927	20.93	0.01 %	581.90	0.006 %
TOTAL		371	EUR 4 384 647.01	9 657.54	9 042.03	4.89 %	715 053	0.19 %

3.4. Industry Sector.

Title of the energy efficiency improvement measure (EEI).		Energy savings grant scheme (in existing undertakings).
Description	**Timeframe**	Start: 2004, Expiry: 2013
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant or special subsidy for implementing energy savings (ES) investments. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers investments consisting in purchasing and installing new equipment and/or materials. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. ‘Energy savings investment’ means investment in systems, equipment and materials whose installation achieves at least 10 % energy savings in a specific application. The maximum grant amount that could be given depending on the type of investment and the form of the eligible grant (regional, de minimis / special subsidy) stood at EUR 250 000 per facility. This measure aims firstly to increase energy savings awareness in the business sector and secondly to have that sector contribute towards savings targets.
	End use category	Industry sector
	Target group	Undertakings (buildings and equipment) in the industry sector The following categories of investors may apply: 1. Natural and legal persons, insofar as they do not carry out an economic activity. 2. Public sector bodies carrying out an economic activity.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	This category relates to investments falling under the following subcategories: Purchase / installation of new equipment for the recovery of waste energy, either directly or indirectly by recovery / recycling of discarded materials, product or employed medium. Purchase / integration of new materials and equipment to reduce reactive power consumption and power losses. Purchase / integration of new equipment for the production, transmission, distribution and use of energy. Purchase/installation of a new energy management computer system and/or integration of automated direct energy regulation/switch-off devices. Replacement of existing materials and/or equipment relating to the subcategories
	Budget and source	EUR 1 537 659.11 Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	Provision of the scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings determined by each individual study and confirmed by the Cyprus Institute of Energy was used to determine the final energy savings declared below. The methodologies described in Annex E paragraph 9 were used.
	Final energy savings achieved	**2 409.8 TOE**

	in 2016.	
	Primary energy savings achieved in 2016.	**604.9 TOE**
	Expected primary energy savings in 2020	**604.9 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	A total of 86 investments were implemented under this category during the implementation of the measure. Some types of investment implemented are: ELEC-SAVER, POWER PLANNER, INVERTERS, Electro Flow, EMS, HEAT RECOVERY SYSTEM, Chillers, BMS, Please note that those of the above investments which are not effective under any of the energy savings targets (depending on the year of implementation) are not included in these targets.

TABLES LISTING DATA ON INVESTMENTS IMPLEMENTED UNDER THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES IN THE INDUSTRY SECTOR

INDUSTRY SECTOR - ENERGY SAVINGS IN UNDERTAKINGS								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**GRANT AMOUNT**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	2004	10	EUR 153 411.92	40 760	40.76	0.02 %	0.00	0.000 %
2	2005	20	EUR 252 922.40	660 189	88.57	0.05 %	0.00	0.000 %
3	2006	12	EUR 181 455.40	208 678	64.40	0.03 %	0.00	0.000 %
4	2007	10	EUR 246 121.39	232 754	229.87	0.12 %	0.00	0.000 %
5	2008	16	EUR 347 951.00	931 250	931.25	0.503 %	0.00	0.000 %
6	2009	13	EUR 290 691.00	450 109	450.08	0.243 %	0.00	0.000 %
7	2010	0	EUR -	0.000	0.00	0.000 %	0.00	0.000 %
8	2011	4	EUR 46 206.00	147 870	147.87	0.080 %	147.87	0.039 %
9	2012	1	EUR 18 900.00	457 039	457.04	0.247 %	457.04	0.122 %
10	2013	0	EUR -	0.000	0.00	0.00 %	0.00	0.000 %
TOTAL		86	EUR 1 537 659.11	**2 409.8**	**2 409.8**	1.30 %	**604.9**	0.16 %

4. Grant scheme for the installation of photovoltaic systems using the net metering method.

Title of the energy efficiency improvement measure (EEI).		Installation of photovoltaic systems using the net metering method for the electricity consumed and generated, for domestic consumers.
Description	**Timeframe**	Start: 2013, Expiry: -
	Purpose / short description	This measure aims at gradually installing 45 000 domestic photovoltaic systems with a capacity of 3kW in the following four (4) or five (5) years. Beneficiaries include all electricity consumers in the residential sector. Vulnerable groups will be given a grant of 50 % of the total investment cost from the Special Fund for RES and ES to purchase and install these systems.
	End use category	Residential sector
	Target group	Existing dwellings
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Installation of PV systems.
	Budget and source	EUR 5 625 329 (by the end of 2016) Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES.
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodology described in Annex E paragraph 10 was used.
	Final energy savings achieved in 2016.	10 495.4 **TOE**
	Primary energy savings achieved in 2016.	10 495.4 **TOE**
	Expected primary energy savings in 2020	10 495.4 **TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	22 711 **TOE (cumulative final energy savings for 2020)**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	The assumptions are included in the methodology described in Annex E paragraph 10.

TABLES LISTING DATA ON THE INSTALLATION OF PHOTOVOLTAIC SYSTEMS (NET-METERING).

Item No	YEAR	Description	Quantity (Systems)	Total Capacity (kW)	Energy Saving per (kW/year)	Total Cumulative Savings 2020 [toe]	Contribution in the target of 2016 (toe)	Contribution in the target of 2020 (toe)	life time
1	**2013**	Photovoltaic systems - Net metering - Grant Scheme. Household Sector Photovoltaic systems - Net metering (3 Kw). Household Sector	880	2612	4179104	0	970	970	23
2	**2014**	Photovoltaic systems - Net metering - Grant Scheme. Household Sector Photovoltaic systems - Net metering (3 Kw). Household Sector	5093	15314	24501872	14750	5689	5689	23
3	**2015**	Photovoltaic systems - Net metering - Grant Scheme. Household Sector Photovoltaic systems - Net metering (3 Kw). Household Sector	2072	6234	9975024	5147	2316	2316	23
4	**2016**	Photovoltaic systems - Net metering - Grant Scheme. Household Sector Photovoltaic systems - Net metering (3 Kw). Household Sector	1090	4090	6544000	2814	1520	1520	23
Total NET- METERING			9,135	28250	45200000	22711	10495	10495	

5. Installation of photovoltaic systems for autoproduction.

Title of the energy efficiency improvement measure (EEI).		Installation of PV systems for autoproduction.
Description	**Timeframe**	Start: 2014, Expiry: -
	Purpose / short description	This measure aims at installing photovoltaic systems in the holdings of commercial and industrial consumers, for own use. Following a relevant decision of the Cyprus Energy Regulatory Authority (CERA), commercial and industrial consumers will be able to install PV systems on the roofs of their holdings, to generate electricity for own use. No grant will be given under this measure for purchasing and installing the systems.
	End use category	Tertiary and industry sector
	Target group	Holdings of commercial and industrial consumers
	Area of application	All of Cyprus

Information concerning implementation	**List and description of actions for measure verification.**	Installation of PV systems.
	Budget and source	-
	Implementing organisation	CERA - EAC
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodology described in Annex E paragraph 11 was used.
	Final energy savings achieved in 2016.	717 **TOE**
	Primary energy savings achieved in 2016.	717 **TOE**
	Expected primary energy savings in 2020	717 **TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	1 759 **TOE (cumulative final energy savings for 2020)**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	The assumptions are included in the methodology described in Annex E paragraph 11.

TABLES LISTING DATA ON THE INSTALLATION OF PHOTOVOLTAIC SYSTEMS - AUTOPRODUCTION

	YEAR	**Description**	**Quantity (Systems)**	**Total Capacity (kW)**	**Energy Saving per (kWh/year)**	**Total Cumulative Savings 2020 [toe]**	**Contribution in the target of 2016 (toe)**	**Contribution in the target of 2020 (toe)**	**life time**
1	**2013**	Installation of PV for commercial and industrial consumers for own use.	0	0.0	0	0.00	0.00	0.00	23
2	**2014**	Installation of PV for commercial and industrial consumers for own use.	18	1200.0	1920000	1155.84	445.82	445.82	23
3	**2015**	Installation of PV for commercial and industrial consumers for own use.	29	731	1168800	603.10	271.40	271.40	23
4	**2016**	Installation of PV for commercial and industrial consumers for own use.	0	0.0	0	0.00	0.00	0.00	23
Total NET- METERING AND AUTO-PRODUCTION			47	1931	3088800	1759	717	717	

6. Green public procurement scheme

Title of the energy efficiency improvement measure (EEI).		National green public procurement action plan.
Description	**Timeframe**	Start: 2007, Expiry: -
	Purpose / short description	‘Green public procurement’ (GPP) means that environmental factors are taken into account in entering into (public) contracts for buying products, services or works falling within the scope of the two Coordination of Public Procurement Procedures Laws (Law 11(I)/2006 and Law 12(I)/2006), with a view to ensuring continued progress in environmental performance, by reducing environmental impacts and maintaining economic sustainability. Energy saving actions included in such contracts relate to the following: **Office equipment and supplies**: photocopiers, fax machines, computers, etc. **Electrical appliances and products:** This field includes purchasing energy saving road lighting equipment by using economy lamps, using photovoltaic systems for road sign and pedestrian crossing lights, purchasing energy efficient electric equipment (refrigerators, air conditioners, etc.), installing photovoltaic systems in public buildings, using solar energy for the heating of buildings, using natural gas instead of diesel in central heating systems, installing light/motion sensors in building areas where no continuous lighting is required and installing photocells for switching on/off lights in the perimeter of roads and in large-perimeter buildings. **New/renovated buildings:** This field includes the preparation of energy designs for all new buildings or the ones to be renovated, irrespective of size, by the use of state-of-the-art building materials that need less maintenance.
	End use category	Public sector
	Target group	public and broader public sector (lights, computer equipment).
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Decision of the Council of Ministers No 65191 of 21 March 2007.
	Budget and source	EUR 29 068 for purchasing fluorescent lamps EUR 890 742 for purchasing new air conditioners, to be installed for the first time EUR 707 761 for purchasing new air conditioners, to replace older ones EUR 8 420 399.40 for purchasing office computers EUR 1 596 776 for purchasing new monitors EUR 663 334 for purchasing VRV and heat pump systems, to replace older ones EUR 84 178 for purchasing boilers, to replace older ones

	Implementing organisation	Environment Service
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The assumptions taken into account in making calculations for the above categories are referred to in the methodologies described in Annex E paragraph 12.
	Final energy savings achieved in 2016.	**667 TOE**
	Primary energy savings achieved in 2016.	**338 TOE**
	Expected primary energy savings in 2020	**178 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	The assumptions are included in the methodologies described in Annex E paragraph 12.

TABLES LISTING DATA ON THE GREEN PUBLIC PROCUREMENT ACTION PLAN

REPLACEMENT OF LAMPS WITH FLUORESCENT LAMPS IN THE PUBLIC SECTOR

	Year	Number of CFL lamps distributed	Unitary energy savings GLS to CFL (kWh/year)	Energy saving in KWh/year	Energy saving in toe/year	Average Lifetime	Total Cost incl. 15% VAT
1	2007	2694	**118**	317892	84.8	6000	-
2	2008	3513	**118**	414534	110.5	6000	-
3	2009	2983	**118**	351994	93.8	6000	-
4	2010	4000	**118**	472000	125.8	6000	€ 8,910
5	2011	3000	**118**	354000	88.3	6000	€ 5,870
6	2012	6000	**118**	708000	176.6	6000	€ 13,054
7	2013	666	**118**	78588	19.6	6000	€ 1,234

Calculation of energy saving in toe/year																
		Energy saving in toe/year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1	2007	84.8	84.8	84.8		0.00	0.00	0.00	0.00	0	0	**0**	0	0	0	0
2	2008	110.5	0	110.5	110.5	**0.0**	0.0	0.0	0.0	0	0	0	0	0	0	0
3	2009	93.8	0	0	93.8	**93.8**	0.0	0.0	0.0	0	0	0	0	0	0	0
4	2010	125.8	0	0	0.00	**125.8**	125.8	0.0	0.0	0	0	0	0	0	0	0
5	2011	88.3	0	0	0.00	**0.00**	88.3	88.3	0.0	0	0	0	0	0	0	0
6	2012	176.6	0	0	0.00	**0.00**	0.0	176.6	176.6	0	0	0	0	0	0	0
7	2013	19.6	0	0	0.00	**0.00**	0.0	0.0	19.6	19.6	0	0	0	0	0	0
Total Energy saving per year (toe)			85	195	204	**219.68**	214	265	196	20	0	**0**	0	0	0	**0**

No	**YEAR**	**NUMBER OF LAMPS**	**PURCHASING COST**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	**2007**	2 694	-	85	0	0 %	0	0 %
2	**2008**	3 513	-	111	0	0 %	0	0 %
3	**2009**	2 983	-	94	0	0 %	0	0 %
4	**2010**	4 000	EUR 8 910.00	126	0	0 %	0	0 %
5	**2011**	3 000	EUR 5 870.00	88	0	0 %	0	0 %
6	**2012**	6 000	EUR 13 054.00	177	0	0 %	0	0 %
7	**2013**	666	EUR 1 234.00	20	0	0 %	0	0 %
TOTAL		22 856	EUR 29 068.00	699	0.00	0.00 %	0.00	0.00 %

REPLACEMENT OF AIR CONDITIONERS IN THE PUBLIC SECTOR

REPLACEMENT OF SPLIT UNITS IN THE PUBLIC SECTOR

Year	Quantity	COOLING CAPACITY [Kw]	EER best_perf_on_market	EER average (assumption by ISBEM)	nh	UFES [kWh/unit/year]	Total Saving [kWh/year]	Total Saving [toe/year]	life time	Budget
2007	1	2.64	2.86	2.5	812	107.93	107.93	0.03	10	€ 390
2007	102	3.50	2.86	2.5	812	143.09	14595.56	3.39	10	€ 57,141
2007	58	4.70	2.86	2.5	812	192.15	11144.96	2.59	10	€ 26,562
2007	10	5.80	2.84	2.5	812	225.53	2255.30	0.52	10	€ 5,825
2007	83	7.00	2.84	2.5	812	272.19	22591.90	5.25	10	€ 42,336
TOTAL 2007	254					940.90	50695.65	11.77		€ 132,254
2008	9	2.64	3.22	2.5	812	191.73	1725.60	0.40	10	€ 3,276
2008	74	3.50	3.20	2.5	812	248.68	18401.95	4.27	10	€ 53,669
2008	5	4.70	3.20	2.5	812	333.94	1669.68	0.39	10	€ 1,986
2008	29	5.27	3.21	2.5	812	378.60	10979.38	2.55	10	€ 12,760
2008	9	6.40	3.20	2.5	812	454.72	4092.48	0.95	10	€ -
2008	57	7.00	3.02	2.5	812	391.48	22314.41	5.18	10	€ 25,895
TOTAL 2008	174					1999.14	59183.49	13.74		€ 97,586
2009	8	2.64	3.22	2.5	812	191.73	1533.86	0.36	10	€ 2,740
2009	53	3.50	3.20	2.5	812	248.68	13179.78	3.06	10	€ 37,578
2009	3	4.70	3.20	2.5	812	333.94	1001.81	0.23	10	€ 1,489
2009	32	5.27	3.21	2.5	812	378.60	12115.18	2.81	10	€ 12,920
2009	1	5.86	3.40	2.5	812	503.82	503.82	0.12	10	€ 500
2009	39	7.00	3.02	2.5	812	391.48	15267.75	3.55	10	€ 16,100

TOTAL 2009	128					2048.25	43602.20	10.12		€ 71,327
2010	64	2.64	3.22	2.5	812	191.73	12270.90	2.85	10	€ 8,200
2010	65	3.50	3.20	2.5	812	248.68	16163.88	4.31	10	€ 25,989
2010	38	5.27	3.21	2.5	812	378.60	14386.78	3.84	10	€ 21,600
2010	41	7.10	3.02	2.5	812	397.07	16280.01	4.34	10	€ 27,958
TOTAL 2010	208					1216.08	59101.57	15.33		€ 83,747
2011	21	2.64	3.22	2.5	812	191.73	4026.39	0.93	10	€ 7,120
2011	42	3.5	3.20	2.5	812	248.68	10444.35	2.43	10	€ 17,259
2011	24	5.27	3.21	2.5	812	378.60	9086.39	2.11	10	€ 14,180
2011	29	7.1	3.02	2.5	812	397.07	11515.13	2.67	10	€ 18,996
TOTAL 2011	116					1216.08	35072.25	4.78		€ 57,555
2012	15	2.64	3.22	2.5	812	191.73	2875.99	0.67	10	€ 5,220
2012	70	3.5	3.20	2.5	812	248.68	17407.25	4.04	10	€ 31,142
2012	60	5.27	3.21	2.5	812	378.60	22715.97	5.27	10	€ 33,375
2012	64	7.1	3.02	2.5	812	397.07	25412.70	5.90	10	€ 50,026
TOTAL 2012	209					1216.08	68411.90	15.89		€ 119,763
2013	43	2.64	3.22	2.5	812	191.73	8244.51	1.91	10	€ 15,890
2013	96	3.5	3.20	2.5	812	248.68	23872.80	5.54	10	€ 44,740
2013	60	5.27	3.21	2.5	812	378.60	22715.97	5.27	10	€ 29,610
2013	65	7.1	3.02	2.5	812	397.07	25809.77	5.99	10	€ 55,289
TOTAL 2013	264					1216.08	80643.05	18.73		€ 145,529
2014	5	5.27	6.91	2.7	812	965.62	4828.11	1.12	10	-
2014	16	7.00	5.96	2.7	812	1151.49	18423.9026	4.28	10	-
2014	30	3.50	6.51	2.7	812	616.03	18481.0036	4.29	10	-
2014	9	3.52	6.51	2.7	812	619.55	5575.9828	1.29	10	-

2014	7	2.64	7.01	2.7	812	488.15	3417.06692	0.79	10	-
2014	33	5.30	6.91	2.7	812	971.12	32046.9072	7.44	10	-
2014	1	2.73	7.01	2.7	812	504.79	504.793977	0.12	10	-
2014	13	7.10	5.96	2.7	812	1167.94	15183.2697	3.53	10	-
TOTAL 2014	114					6484.711	98461.0343	22.8626522		0
2015	12	7.00	6.48	2.7	812	1228.02	14736.30	3.42	10	-
2015	13	5.00	6.54	2.7	812	882.91	11477.81	2.67	10	-
2015	59	6.30	6.30	2.7	812	1082.67	63877.33	14.83	10	-
2015	69	3.50	7.10	2.7	812	652.31	45009.45	10.45	10	-
2015	2	5.00	6.48	2.7	812	877.16	1754.32	0.41	10	-
2015	5	3.50	6.75	2.7	812	631.56	3157.78	0.73	10	-
2015	8	5.00	6.01	2.7	812	828.16	6625.30	1.54	10	-
2015	3	3.60	6.12	2.7	812	605.02	1815.06	0.42	10	-
2015	3	7.10	6.14	2.7	812	1196.30	3588.90	0.83	10	-
TOTAL 2015	174					7984.111	152042.26	35.3042127		
TOTAL 2007-2015	1641	0	0	0	0	24321	647213	148.53		€ 707,761
Note that nh = 1400hours x 0.58 = 812										

REPLACEMENT OF SPLIT UNITS IN PUBLIC SECTOR - Calculation of energy saving in toe/year

		Energy saving in toe/year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020
1	2007	13.5	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	0.00	0.00	0.00
2	2008	15.8	0.00	15.78	15.78	15.78	15.78	15.78	15.78	15.78	15.78	15.78	15.78	0.00	0.00
3	2009	11.6	0.00	0.00	11.62	11.62	11.62	11.62	11.62	11.62	11.62	11.62	11.62	11.62	0.00
4	2010	15.8	0.00	0.00	0.00	15.76	15.76	15.76	15.76	15.76	15.76	15.76	15.76	15.76	0.00

5	2011	5.1	0.00	0.00	0.00	0.00	5.14	5.14	5.14	5.14	5.14	5.14	5.14	5.14	5.14
6	2012	17.1	0.00	0.00	0.00	0.00	0.00	17.06	17.06	17.06	17.06	17.06	17.06	17.06	17.06
7	2013	20.1	0.00	0.00	0.00	0.00	0.00	0.00	20.11	20.11	20.11	20.11	20.11	20.11	20.11
Total Energy saving per year (toe)			13.52	29.29	40.92	**56.67**	61.81	78.87	98.99	98.99	98.99	**98.9869**	85.47	69.69	**42.31**

REPLACEMENT OF SPLIT UNITS IN THE PUBLIC SECTOR								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**GRANT AMOUNT**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	2007	254	EUR 132 254	13.52	13.52	0.01 %	0.00	0.00 %
2	2008	174	EUR 97 586	15.78	15.78	0.01 %	0.00	0.00 %
3	2009	128	EUR 71 327	11.62	11.62	0.01 %	0.00	0.00 %
4	2010	208	EUR 83 747	15.76	15.76	0.01 %	0.00	0.00 %
5	2011	116	EUR 57 555	5.14	5.14	0.00 %	5.14	0.00 %
6	2012	209	EUR 119 763	17.06	17.06	0.01 %	17.06	0.00 %
7	2013	264	EUR 145 529	20.11	20.11	0.01 %	20.11	0.00 %
TOTAL		**1 353**	**EUR 707 761**	**98.99**	**98.99**	**0.05 %**	**42.31**	**0.01 %**

INSTALLATION OF NEW AIR CONDITIONERS IN THE PUBLIC SECTOR

INSTALLATION OF SPLIT UNITS IN THE PUBLIC SECTOR										
Year	**Quantity**	**COOLING CAPACITY [Kw]**	**EER best_perf_on_market**	**EER average**	**nh**	**UFES [kWh/unit/year]**	**Total Saving [kWh/year]**	**Total Saving [toe/year]**	**life time**	**Budget**
2007	2	2.64	2.86	2.7	812	44.42	88.83	0.02	10	€ 780
2007	106	3.50	2.86	2.7	812	58.89	6241.95	1.66	10	€ 39,075
2007	56	4.70	2.86	2.7	812	79.08	4428.25	1.18	10	€ 28,000
2007	15	5.80	2.84	2.7	812	85.99	1289.80	0.34	10	€ 8,750
2007	93	7.00	2.84	2.7	812	103.78	9651.24	2.57	10	€ 54,200
TOTAL 2007	272					372.14	21700.06	5.79		€ 130,805
2008	37	2.64	3.22	2.7	812	128.22	4744.01	1.26	10	€ 13,128
2008	53	3.50	3.20	2.7	812	164.47	8716.78	2.32	10	€ 20,858
2008	6	4.70	3.20	2.7	812	220.86	1325.14	0.35	10	€ 3,089
2008	46	5.27	3.21	2.7	812	251.81	11583.13	3.09	10	€ 24,830

2008	0	6.40	3.20	2.7	812	300.74	0.00	0.00	10	€ -
2008	62	7.00	3.02	2.7	812	223.07	13830.09	3.69	10	€ 42,135
TOTAL 2008	204					1289.154	40199.15	10.72		€ 104,040
2009	28	2.64	3.22	2.7	812	128.22	3590.06	0.96	10	€ 9,490
2009	74	3.50	3.20	2.7	812	164.47	12170.60	3.24	10	€ 18,552
2009	11	4.70	3.20	2.7	812	220.86	2429.42	0.65	10	€ 6,489
2009	46	5.27	3.21	2.7	812	251.81	11583.13	3.09	10	€ 22,860
2009	7	5.86	3.40	2.7	812	362.83	2539.84	0.68	10	€ 5,052
2009	50	7.00	3.02	2.7	812	223.07	11153.30	2.97	10	€ 31,592
TOTAL 2009	216					1351.25	43466.35	11.59		€ 94,035
2010	52	2.64	3.22	2.7	812	128.22	6667.25	1.78	10	€ 16,560
2010	157	3.5	3.2	2.7	812	164.47	25821.41	6.88	10	€ 60,132
2010	72	5.27	3.21	2.7	812	251.81	18130.11	4.83	10	€ 35,650
2010	102	7.1	3.02	2.7	812	226.25	23077.77	6.15	10	€ 66,882
TOTAL 2010	383					770.74	73696.55	19.65		€ 179,224
2011	42	2.64	3.22	2.7	812	128.22	5385.09	1.34	10	€ 13,620
2011	109	3.5	3.2	2.7	812	164.47	17926.97	4.47	10	€ 50,074
2011	46	5.27	3.21	2.7	812	251.81	11583.13	2.89	10	€ 21,640
2011	86	7.1	3.02	2.7	812	226.25	19457.73	4.85	10	€ 57,384
2011	1	12.4	3	2.7	812	372.92	372.92	0.09	10	€ 1,930
TOTAL 2011	284					1143.66	54725.83	13.65		€ 144,648
2012	47	2.64	3.22	2.7	812	128.22	6026.17	1.50	10	€ 15,410
2012	94	3.5	3.2	2.7	812	164.47	15459.95	3.86	10	€ 34,045
2012	52	5.27	3.21	2.7	812	251.81	13093.97	3.27	10	€ 23,880
2012	85	7.1	3.02	2.7	812	226.25	19231.47	4.80	10	€ 47,882
2012	1	16.2	3	2.7	812	487.20	487.20	0.12	10	€ 1,800
TOTAL 2012	279					1257.94	54298.7706	13.54		€ 123,017
2013	35	2.64	3.22	2.7	812	128.22	4487.57	1.12	10	€ 15,100
2013	69	3.5	3.2	2.7	812	164.47	11348.26	2.83	10	€ 24,350
2013	43	5.27	3.21	2.7	812	251.81	10827.71	2.70	10	€ 29,250
2013	57	7.1	3.02	2.7	812	226.25	12896.40	3.22	10	€ 46,273
TOTAL 2013	204					770.74	39559.95	9.87		€ 114,973
TOTAL 2007-2013	**1842**					**6955.64**	**327646.66**	**84.79**	**0**	**€ 890,742**

INSTALLATION OF SPLIT UNITS IN THE PUBLIC SECTOR - Calculation of energy saving in toe/year

		Energy saving in toe/year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2020**
1	2007	5.8	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	0.00	0.00	0.00
2	2008	10.7	0.00	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	0.00	0.00

3	2009	11.6	0.00	0.00	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59	0.00
4	2010	19.6	0.00	0.00	0.00	19.65	19.65	19.65	19.65	19.65	19.65	19.65	19.65	19.65	0.00
5	2011	13.6	0.00	0.00	0.00	0.00	13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.65
6	2012	13.5	0.00	0.00	0.00	0.00	0.00	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54
7	2013	9.9	0.00	0.00	0.00	0.00	0.00	0.00	9.87	9.87	9.87	9.87	9.87	9.87	9.87
Total Energy saving per year (toe)			5.79	16.50	28.09	47.74	61.39	74.93	84.79	84.79	84.79	84.79	79.01	68.29	37.06

INSTALLATION OF SPLIT UNITS IN THE PUBLIC SECTOR								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**GRANT AMOUNT**	**ENERGY SAVINGS TOE/YEAR**	**CONTRIBUTION TOWARDS END USE TARGET (2016)**		**ENERGY SAVINGS TOWARDS THE TARGET FOR 2020**	
					TOE	**%**	**TOE**	**%**
1	2007	272	EUR 130 805	5.79	5.79	0.00 %	0.00	0.00 %
2	2008	204	EUR 104 040	10.72	10.72	0.01 %	0.00	0.00 %
3	2009	216	EUR 94 035	11.59	11.59	0.01 %	0.00	0.00 %
4	2010	383	EUR 179 224	19.65	19.65	0.01 %	0.00	0.00 %
5	2011	284	EUR 144 648	13.65	13.65	0.01 %	13.65	0.00 %
6	2012	279	EUR 123 017	13.54	13.54	0.01 %	13.54	0.00 %
7	2013	204	EUR 114 973	9.87	9.87	0.01 %	9.87	0.00 %
TOTAL		**1 842**	**EUR 890 742**	**84.79**	**84.79**	**0.05 %**	**37.06**	**0.01 %**

REPLACEMENT OF VRVs AND HEAT PUMPs IN THE PUBLIC SECTOR

REPLACEMENT OF VRV AND HEAT PUMP CHILERS IN THE PUBLIC SECTOR											
Year	**Description**	**Quantity**	**COOLING CAPACITY [Kw]**	**EER best_perf_on_market**	**EER average (Assumption by ISBEM)**	**nh**	**UFES [kWh/unit/year]**	**Total Saving [kWh/year]**	**Total Saving [toe/year]**	**life time**	**Budget**
2010	VRV	2	28.00	3.77	2	812	5337.23	10674.46	2.48	10	-
2010	VRV	1	33.50	3.48	2	812	5784.33	5784.33	1.34	10	-
2010	VRV	1	40.00	3.23	2	812	6184.27	6184.27	1.44	10	-
2010	VRV	1	11.90	3.58	2	812	2132.29	2132.29	0.50	10	€ 11,739
2010	HEAT PUMP	4	150.00	2.87	2	812	18460.98	73843.90	17.15	10	€ 150,000

	CHILLER										
2010	HEAT PUMP CHILLER	1	745.00	3.11	2	812	107956	107955.53	25.07	10	€ 75,000
TOTAL 2010		10					145854.64	206574.79	47.97		€ 236,739
2011	VRV	4	70	3.20	2	812	10657.50	42630.00	10.63	10	€ 88,000
2011	HEAT PUMP CHILLER	1	100	2.70	2	812	10525.93	10525.93	2.63	10	€ 18,000
2011	SPLIT UNIT	1	16.2	3.00	2.5	812	876.96	876.96	0.22	10	€ 1,800
TOTAL 2011		6					22060.39	54032.89	13.48		€ 107,800
2012	HEAT PUMP CHILLER	1	226	2.83	2	812	26910.77	26910.77	6.25	10	€ 24,200
2012	HEAT PUMP CHILLER	1	300	2.70	2	812	31577.78	31577.78	7.33	10	€ -
TOTAL 2012		2					58488.55	58488.55	13.58		€ 24,200
2013	VRV	1	50.4	3.42	2	812	8496.08	8496.08	1.97	10	€ 11,666
2013	VRV	1	56	3.34	2	812	9121.63	9121.63	2.12	10	€ 13,000
2013	VRV	1	90	3.60	2	812	16240.00	16240.00	3.77	10	€ 32,000
2013	HEAT PUMP CHILLER	1	543	2.87	2	812	66828.73	66828.73	5.52	10	€ 76,579
2013	HEAT PUMP CHILLER	1	348.8	2.64	2	812	34330.38	34330.38	7.97	10	€ 53,600
2013	HEAT PUMP CHILLER	1	498.4	2.87	2	812	61339.67	61339.67	14.24	10	€ 72,200
2013	HEAT PUMP CHILLER	1	226	2.57	2	812	20350.55	20350.55	4.73	10	€ 35,550
TOTAL 2013		7					216707.04	216707.04	50.32		€ 294,595
2014	HEAT PUMP CHILLER	2	590.00	2.91	2.4	812	34984.36	69968.73	16.25	10	€ -
2014	HEAT PUMP CHILLER	2	413.00	2.98	2.2	812	39898.97	79797.95	18.53	10	€ -
2014	Water cooler	1	95.00	3.86	2.2	812	15079.18	15079.18	3.50	10	€ -
2014	HEAT PUMP CHILLER	1	500	2.70	2	812	52629.63	52629.63	12.22	10	€ -

TOTAL 2014		6					142592.15	217475.49	50.50		0
2015	VRV	2	95.20	4.42	2.4	812	14720.10	29440.21	6.84	10	€ -
2015	VRV	4	112.00	4.43	2.4	812	17364.21	69456.85	16.13	10	€ -
2015	VRV	3	45.00	3.51	2.4	812	4814.74	14444.23	3.35	10	€ -
TOTAL 2015		9					36899.06	113341.29	26.32		
TOTAL 2010-2015		40					622602	866620	202	0	€ 663,334.00
Note that nh = 1400hours x 0.58 = 812											

REPLACEMENT OF VRV AND HEAT PUMP CHILERS IN THE PUBLIC SECTOR - Calculation of energy saving in toe/year

		Energy saving in toe/year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020	2021
1	2010	48.0	0.00	47.97	47.97	47.97	47.97	47.97	47.97	47.97	47.97	47.97	0.00	0.00
2	2011	13.5	0.00	0.00	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	13.48	0.00
3	2012	13.6	0.00	0.00	0.00	13.58	13.58	13.58	13.58	13.58	13.58	13.58	13.58	13.58
4	2013	50.3	0.00	0.00	0.00	0.00	50.32	50.32	50.32	50.32	50.32	50.32	50.32	50.32
5	2014	50.5	0.00	0.00	0.00	0.00	0.00	50.50	50.50	50.50	50.50	50.50	50.50	50.50
6	2015	26.3	0.00	0.00	0.00	0.00	0.00	0.00	26.32	26.32	26.32	26.32	26.32	26.32
Total Energy saving per year (toe)			0.00	47.97	61.44	75.02	125.34	175.84	202.16	202.16	202.16	202.16	154.19	140.72

No	YEAR	NUMBER OF INVESTMENTS	Expenditure amount	ENERGY SAVINGS in year of installation toe/year	CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION toe	%	ENERGY SAVINGS CONCERNING 2020 TARGET (PRIMARY CONSUMPTION) toe	%
1	2010	10	EUR 236 739	47.97	47.97	0.03 %	0.00	0.00 %
2	2011	6	EUR 107 800	13.48	13.48	0.01 %	13.48	0.00 %
3	2012	2	EUR 24 200	13.58	13.58	0.01 %	13.58	0.00 %
4	2013	7	EUR 294 595	50.32	50.32	0.03 %	50.32	0.01 %
5	2014	6	EUR -	50.50	50.50	0.03 %	50.50	0.01 %
6	2015	9	EUR -	26.32	26.32	0.01 %	26.32	0.01 %
TOTAL		**40**	**EUR 663 334**	**202.16**	**202.16**	**0.11 %**	**154.19**	**0.04 %**

PURCHASING NEW COMPUTERS IN THE PUBLIC SECTOR

	NEW DESKTOP PC IN PUBLIC SECTOR				
YEAR	**COST**	**QUANTITY**	**ENERGY SAVINGS [Kwh/year]**	**TOTAL ENERGY SAVINGS [Kwh/year]**	**TOTAL ENERGY SAVINGS [toe/year]**
2007	€ 3,988,322.08	878	39	34242.00	9.13
2008		1199	39	46761.00	12.47
2009		5391	39	210249.00	56.05
2010	€ 2,013,910.00	5443	39	212277.00	56.59
2011	€ 1,242,647.32	4195	39	163605.00	40.80
2012	€ 1,048,932.00	2538	39	98982.00	24.69
2013	€ 126,588.00	274	39	10686.00	2.67
TOTAL	€ 8,420,399.40	19918		776802.00	202.40

NEW DESKTOP PC IN PUBLIC SECTOR - Calculation of energy saving in toe/year												
Lifetime = 3 years		**Energy saving in toe/year**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	2007	9.1	9.13	9.13	9.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2008	12.5	0.00	12.47	12.47	12.47	0.00	0.00	0.00	0.00	0.00	0.00
3	2009	56.1	0.00	0.00	56.05	56.05	56.05	0.00	0.00	0.00	0.00	0.00
4	2010	56.6	0.00	0.00	0.00	56.59	56.59	56.59	0.00	0.00	0.00	0.00
5	2011	40.8	0.00	0.00	0.00	0.00	40.80	40.80	40.80	0.00	0.00	0.00
6	2012	24.7	0.00	0.00	0.00	0.00	0.00	24.69	24.69	24.69	0.00	0.00
7	2013	2.7	0.00	0.00	0.00	0.00	0.00	0.00	2.67	2.67	2.67	0.00
Total Energy saving per year (toe)			9.13	21.60	77.65	125.11	153.45	122.08	68.15	27.35	2.67	**0.00**

PURCHASING NEW MONITORS IN THE PUBLIC SECTOR

	NEW LCD MONITORS				
YEAR	**COST**	**QUANTITY**	**ENERGY SAVINGS [Kwh/year]**	**TOTAL ENERGY SAVINGS [Kwh/year]**	**TOTAL ENERGY SAVINGS [toe/year]**
2007	€ 265,226.00	954.00	11	10494.00	2.80
2008		1347.00	11	14817.00	3.95
2009		5809.00	11	63899.00	17.04
2010	€ 632,385.00	5499.00	11	60489.00	16.13
2011	€ 435,096.00	4356.00	11	47916.00	12.77
2012	€ 238,680.00	2602.00	11	28622.00	7.63
2013	€ 25,389.00	279.00	11	3069.00	0.82
TOTAL	€ 1,596,776.00	20846.00		229306.00	61.13

NEW LCD MONITORS IN PUBLIC SECTOR - Calculation of energy saving in toe/year												
Lifetime = 3 years		**Energy saving in toe/year**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	2007	2.80	2.80	2.80	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2008	3.95	0.00	3.95	3.95	3.95	0.00	0.00	0.00	0.00	0.00	0.00
3	2009	17.04	0.00	0.00	17.04	17.04	17.04	0.00	0.00	0.00	0.00	0.00
4	2010	16.13	0.00	0.00	0.00	16.13	16.13	16.13	0.00	0.00	0.00	0.00
5	2011	12.77	0.00	0.00	0.00	0.00	12.77	12.77	12.77	0.00	0.00	0.00
6	2012	7.63	0.00	0.00	0.00	0.00	0.00	7.63	7.63	7.63	0.00	0.00
7	2013	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.82	0.82	0.00
Total Energy saving per year (toe)			2.80	6.75	23.78	**37.11**	45.94	36.53	21.22	8.45	0.82	**0.00**

REPLACEMENT OF BOILERS IN PUBLIC SECTOR BUILDINGS

Replacement of heating systems (boilers) in public sector buildings										
No	**Building type**	**Year of installation**	**Expected lifecycle**	**A Floor area (m2)**	**SHD Specific Heat Demand (kWh/m2/year)**	**ηinit Efficiency rating of heating equipment (existing boiler)**	**ηinit Efficiency rating of heating equipment (new boiler)**	**UFES Savings (kWh/year)**	**UFES Savings (TOE/year)**	**BUDGET**
1	Extension of Alternative Detention Premises	2010	25	1 500	50	0.6	0.930	44 355	0.381	EUR 2 500.00
2	Larnaca General Hospital	2010	25	17 285	50	0.6	0.910	490 691	4.220	EUR 17 600.00
TOTAL 2010								535 046	4.601	EUR 20 100.00
1	Transit building for irregular immigrants in Menoghia	2011	25	3 566	50	0.6	0.900	99 056	0.852	EUR 12 000.00
2	Police Academy	2011	25	2 270	73	0.6	0.905	93 078	0.800	EUR 6 000.00
TOTAL 2011								192 134	1.652	18 000.000
1	District Court of Paphos	2012	25	1 260	73	0.6	0.905	51 665	0.444	EUR 11 858.00
TOTAL 2012								51 665	0.444	EUR 11 858.00
1	Police Station of Pyli, Paphos	2013	25	2 224	73	0.6	0.905	91 192	0.784	EUR 2 540.00
2	Firefighting Station No 3	2013	25	750	73	0.6	0.933	32 568	0.280	EUR 890 00
3	District Court of Nicosia, building 4	2013	25	1 727	73	0.6	0.905	70 813	0.609	EUR 2 540.00
4	Limassol General Hospital	2013	25	32 000	50	0.6	0.955	991 274	8.525	EUR 28 250.00
TOTAL 2013								1 185 848	10.20	EUR 34 220.00
TOTAL 2010-2013								1 964 693	17	EUR 84 178.00

Replacement of heating systems (boilers) in public sector buildings - energy savings												
	YEAR OF INSTALLATION	**Savings (TOE/year)**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2020**
1	2010	4.6	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
2	2011	1.7	0.00	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
3	2012	0.4	0.00	0.00	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
4	2013	10.2	0.00	0.00	0.00	10.20	10.20	10.20	10.20	10.20	10.20	10.20
Total Energy savings per year (toe)		16.9	**4.60**	6.25	6.70	16.90	16.90	16.90	**16.9**	16.90	16.90	**16.9**

No	YEAR	NUMBER OF INVESTMENTS	GRANT AMOUNT	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
					TOE	%	TOE	%
1	2010	2	EUR 20 100	4.60	4.60	0.00 %	4.60	0.00 %
2	2011	2	EUR 18 000	**1.652**	1.65	0.00 %	1.65	0.000 %
3	2012	1	EUR 11 858	**0.444**	0.44	0.00 %	0.44	0.000 %
4	2013	4	EUR 34 220	**10.20**	10.20	0.01 %	10.20	0.00 %
TOTAL		9	EUR 84 178	16.90	**16.90**	**0.01 %**	**16.90**	**0.00 %**

7. Vehicle Scrapping Scheme (Scrapping)

Title of the energy efficiency improvement measure (EEI).		Vehicles scrapping 2008-2010
Description	**Timeframe**	Start: 2008, Expiry: 2010
	Purpose / short description	The Scrapping Scheme aims at protecting the environment and improving road safety.
	End use category	Transport sector
	Target group	Scrapping of vehicles aged over 15 years.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	**Grant category C(i) (EUR 1 283)** – Scrapping of vehicles with a valid registration in the last 12 months before the date of entry into force of the scheme. – It is necessary to purchase a new vehicle with a fuel consumption of 5-7 l/100km or a motorcycle. **Grant category C(ii) (EUR 1 710)** – Scrapping of vehicles with a valid registration in the last 12 months before the date of entry into force of the scheme. – It is necessary to purchase a new vehicle with a fuel consumption of at least 5 l/100km.
	Budget and source	EUR 5 785 055.00, Department of Road Transport
	Implementing organisation	Department of Road Transport

	Competent monitoring authority	Department of Road Transport
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodology is described in Annex E paragraph 13.
	Final energy savings achieved in 2016.	**2 822.8 TOE**
	Primary energy savings achieved in 2016.	**167 TOE**
	Expected primary energy savings in 2020	**167 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**
	Assumptions	The assumptions are included in the methodology described in Annex E paragraph 13.

TABLES LISTING DATA ON VEHICLE SCRAPPING

No	**Scrapping category**	**Year of scrapping**	**Number of vehicles**	**Savings per vehicle (toe)**	**Total savings (toe)**	**Effective period of the investment**	**Last year of effective period of the measure**	**GRANT / VEHICLE**	**TOTAL GRANT**
1	Category C(i) – Energy savings due to the operation of the scrapping scheme for vehicles aged over 10 years upon purchase of a vehicle with an average fuel consumption of **6l/100km**	2008	1 796	0.628	1 127 888	15 years	2023	1 283	EUR 2 304 268
2	Category C(ii) – Energy savings due to the operation of the scrapping scheme for vehicles aged over 10 years upon purchase of a vehicle with an average fuel consumption of **4.3l/100km**	2008	655	0.896	586.88	15 years	2023	1 710	EUR 1 120 050
3	Category C(i) – Energy savings due to the operation of the scrapping scheme for vehicles aged over 10 years upon purchase of a vehicle with an average fuel consumption of **6l/100km**	2009	1 019	0.628	639 932	15 years	2024	1 283	EUR 1.307.377
4	Category C(ii) – Energy savings due to the operation of the scrapping scheme for vehicles aged over 10 years upon purchase of a vehicle with an average fuel consumption of **4.3l/100km**	2009	336	0.896	301 056	15 years	2024	1 710	EUR 574 560

5	Category C(i) – Energy savings due to the operation of the scrapping scheme for vehicles aged over 10 years upon purchase of a vehicle with an average fuel consumption of **6l/100km**	2010	266	0.628	167 048	15 years	2025	1 800	EUR 478 800.00
	TOTAL		**4 072**		**2 822 804**				EUR 5 785 055.00

No	YEAR	NUMBER OF INVESTMENTS	GRANT AMOUNT	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
				TOE	%	TOE	%
1	2008	**2 451**	EUR 3 424 318	1 714 768	0.927 %	0	0.000 %
2	2009	**1 355**	EUR 1 881 937	940 988	0.509 %	0	0.000 %
3	2010	**266**	EUR 478,800	167 048	0.090 %	167 048	0.045 %
TOTAL		**4 072**	EUR 5 785 055	2 822 804	1.526 %	167 048	0.045 %

8. Grant schemes for vehicles

Title of the energy efficiency improvement measure (EEI).		Energy savings grant scheme in transport (purchasing hybrid, electric and low-pollutant vehicles) 2004-2009.
Description	**Timeframe**	Start: 2004, Expiry: 2009
	Purpose / short description	The scheme aims to provide economic incentives in the form of a State grant or special subsidy for implementing energy savings (ES) investments. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers only investments implemented in the absence of national or Community standards. The scheme covers investments consisting in purchasing and installing new equipment and/or materials. It also covers the cost of designs, where necessary. The investments should relate to mature technologies, exclusive of ones that are at a research and development stage. A grant is given for the purchase of up to seven (7) new vehicles by undertakings and one vehicle by natural persons for the vehicle categories described below.
	End use category	Transport sector
	Target group	The following categories of investors may apply: 1. Natural persons, insofar as they do not carry out an economic activity and live permanently in areas under the control of the Republic of Cyprus. 2. Organisations which provide services to society as a whole and other services of a social or individual nature (school boards, charitable institutions, monasteries, churches, municipalities, communities, State agencies, etc.) which are active in areas under the control of the Republic of Cyprus, insofar as they do not carry out an economic activity. 3. Natural and legal persons, insofar as they do not carry out an economic activity. 4. Public sector bodies carrying out an economic activity.

<table>
<tr><td></td><td>Area of application</td><td>All of Cyprus</td></tr>
<tr><td>Information concerning implementation</td><td>List and description of actions for measure verification.</td><td>This measure consists in giving grants for the following vehicle types:
• Hybrid vehicles
• Electric vehicles
• Vehicles with carbon dioxide emissions levels lower than 120 g/Km</td></tr>
<tr><td></td><td>Budget and source</td><td>EUR 2.611.923
Special Fund for RES and ES</td></tr>
<tr><td></td><td>Implementing organisation</td><td>Special Fund for RES and ES</td></tr>
<tr><td></td><td>Competent monitoring authority</td><td>Energy Service of MECIT.</td></tr>
<tr><td>Energy savings</td><td>Method used for monitoring/calculating energy savings.</td><td>The methodology is described in Annex E paragraph 14.</td></tr>
<tr><td></td><td>Final energy savings achieved in 2016.</td><td>1 073.5 TOE</td></tr>
<tr><td></td><td>Primary energy savings achieved in 2016.</td><td>0 TOE</td></tr>
<tr><td></td><td>Expected primary energy savings in 2020</td><td>0 TOE</td></tr>
<tr><td></td><td>Contribution towards the target referred to in Article 7 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td></td><td>Contribution towards the target referred to in Article 5 of Directive 2012/27/EU</td><td>NO</td></tr>
<tr><td></td><td>Assumptions</td><td>A total of 3 092 investments were implemented during the implementation of the measure. The quantities under each category are detailed below:
<table>
<tr><th>Category</th><th>Quantity</th></tr>
<tr><td>Hybrid vehicles</td><td>831</td></tr>
<tr><td>Electric vehicles</td><td>32</td></tr>
<tr><td>Vehicles with carbon dioxide emissions levels lower than 120 g/Km</td><td>2 229</td></tr>
</table>
The assumptions are included in the methodology described in Annex E paragraph 14.</td></tr>
</table>

TABLES LISTING DATA ON THE GRANT SCHEMES FOR VEHICLES (ELECTRIC, HYBRID, LOW-POLLUTANT)

HYBRID VEHICLES

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT	GRANT AMOUNT	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
						TOE	%	TOE	%
1	2006	76	15	EUR 997 338	32.26	32.26	0.02 %	0.00	0.00 %
2	2007	253	15		107.40	107.40	0.06 %	0.00	0.00 %
3	**2008**	338	15		143.48	143.48	0.08 %	0.00	0.00 %
4	**2009**	164	15		69.62	69.62	0.04 %	0.00	0.00 %
TOTAL		**831**		**EUR 997 338**	**352.76**	**352.76**	**0.19 %**	**0.00**	**0.00 %**

ELECTRIC VEHICLES

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT	GRANT AMOUNT	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
						TOE	%	TOE	%
1	2006	7	15	EUR 22 566	4.35	4.35	0.00 %	0.00	0.00 %
2	2007	0	15		0.00	0.00	0.00 %	0.00	0.00 %
3	**2008**	25	15		15.55	15.55	0.01 %	0.00	0.00 %
4	**2009**	0	15		0.00	0.00	0.00 %	0.00	0.00 %
TOTAL		**32**		**EUR 22 566**	**19.90**	**19.90**	**0.01 %**	**0.00**	**0.00 %**

LOW-POLLUTANT VEHICLES

No	YEAR	NUMBER OF INVESTMENTS	DURATION OF INVESTMENT	GRANT AMOUNT	ENERGY SAVINGS TOE/YEAR	CONTRIBUTION TOWARDS END USE TARGET (2016)		ENERGY SAVINGS TOWARDS THE TARGET FOR 2020	
						TOE	%	TOE	%
1	2006	0	15	EUR 1 592 019	0.00	0.00	0.00 %	0.00	0.00 %
2	2007	291	15		91.49	91.49	0.05 %	0.00	0.00 %
3	**2008**	859	15		270.07	270.07	0.15 %	0.00	0.00 %
4	**2009**	1 079	15		339.24	339.24	0.18 %	0.00	0.00 %
TOTAL		**2 229**		**EUR 1 592 019**	**700.80**	**700.80**	**0.38 %**	**0.00**	**0.00 %**

9. Compact fluorescent lamps campaign.

Title of the energy efficiency improvement measure (EEI).		Distribution of fluorescent lamps free of charge.
Description	**Timeframe**	Start: 2007, Expiry:2012
	Purpose / short description	This measure consisted in distributing 6 free compact fluorescent lamps to each domestic electricity consumer from 2006 to 2010, following a decision of the Council of Ministers. Beneficiaries included all EAC's domestic consumers falling under tariff categories 05, 06, 07 and 08, as well as all non-profit organisations, churches, schools, utilities and charitable institutions. Families with many children, non-profit organisations, churches, etc. are entitled to 10 compact fluorescent lamps. As it was impossible to distribute all lamps by the end of 2010, it was decided to carry on distributing them in 2011 and 2012.
	End use category	Buildings in the residential and tertiary sectors (non-profit organisations, churches, schools, utilities and charitable institutions)
	Target group	All buildings falling under the above fields
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Decision No 62 738Z of the Council of Ministers of 13 October 2005
	Budget and source	EUR 2 710 840 The information was provided by the Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The bottom-up methodology as referred to in page 77 of the Commission's proposed methodologies section was applied, using certain assumptions referred to in the methodology described in Annex E paragraph 15.
	Final energy savings achieved in 2016.	**13 696.3 TOE**
	Primary energy savings achieved in 2016.	**13 696.3 TOE (please note that only the lamps distributed in 2011 and 2012 are taken into account for the contribution)**
	Expected primary energy savings in 2020	**9 767.5 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**

TABLES LISTING DATA ON COMPACT FLUORESCENT LAMPS CAMPAIGN

	Compact Fluorescence Lamps Campaign
Remarks:	**For the evaluation of annual energy savings derived from the replacement of lamps with Compact Fluorescence Lamps, used the methodology of page 77 of Measurement and verification Methods in the frame of Directive 2006/32/EC**
	1. Due to the lack of data for the variable PSTOCK_AVERAGE ,for the calculations for the Unitary energy savings GLS to CFL used, the default value 47 kWh/year of table 1.2 of page 84 of the above mention Measurement and verification Methods.
	2. For the variable Average Operating Hours used the default value 1000h/year of table 1.2 of page 84 of the above mention Measurement and verification Methods.
	3. The total energy savings per year shall be given by the number of the CFL multiplied by the above default value of the unitary energy saving GLS to CFL.
	4. In the year 2007 distributed 373.374 CFL with average lifetime 6.000h
	5. In the year 2008 distributed 373.374 CFL with average lifetime 8.000h
	7. In the year 2010 distributed 360.000 CFL with average lifetime 10.000h
	8. In the year 2011 distributed 245.000 CFL with average lifetime 10.000h.
	8. In the year 2012 distributed 895.000 CFL with average lifetime 10.000h.
	9. Note that we assume the distributed CFL immediately replace existing bulbs.
	10. A Conversion factor of 2.7 has been applied for electricity savings.

	Year	**Number of CFL lamps distributed**	**Unitary energy savings GLS to CFL (kWh/year)**	**Energy saving in KWh/year**	**Energy saving in toe/year**	**Average Lifetime**
1	2007	373374	**47**	17548578	4075	6000
2	2008	373374	**47**	17548578	4075	8000
3	2010	360000	**47**	16920000	3929	10000
4	2011	245000	**47**	11515000	2674	10000
5	2012	650000	**47**	30550000	7094	10000

Calculation of energy saving in toe/year																
		Energy saving in toe/year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1	2007	4075	4075	4075	4075	4075	4075	4075	0	0	0	**0**	0	0	0	0
2	2008	4075	0	4075	4075	4075	4075	4075	4075	4075	4075	0	0	0	0	0
3	2010	3929	0	0	0	**3929**	**3929**	**3929**	**3929**	3929	**3929**	**3929**	**3929**	**3929**	**3929**	0
4	2011	2674	0	0	0	**0**	2674	2674	2674	2674	2674	2674	2674	2674	2674	2674
5	2012	7094	0	0	0	**0**	0	7094	7094	7094	7094	7094	7094	7094	7094	7094
Total Energy saving per year (toe)			4075	8150	8150	**12078.4**	14752	21846	17771	17771	17771	**13696**	13696	13696	13696	**9767**

A/A	Year	Quantity	Total Price	ENERGY SAVINGS in year of installation toe/year	CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION		CONTRIBUTION TOWARDS THE PRIMARY CONSUMPTION TARGET (2020)	
					toe	**%**	**toe**	**%**
1	**2007**	373374	€ 643,206.00	4 678	0	0.0 %	0	0.00 %
2	**2008**	373374	€ 694,666.00	4 678	0	0.0 %	0	0.00 %
3	**2010**	360000	€ 1,372,968.00	4 511	3 929	2.1 %	0	0.00 %
4	**2011**	245000		2 872	2 674	1.4 %	2 674	0.71 %
5	**2012**	650000		7 619	7 094	3.8 %	7 094	1.89 %
ΣΥΝΟΛΟ		**2001748**	**€ 2,710,840.00**	**24 359**	**13 696**	**7.40 %**	**9 767**	2.60 %

10. 'Save & Upgrade' grant scheme

10.1 'Save & Upgrade' grant scheme for dwellings

Title of the energy efficiency improvement measure (EEI).		**'Save & Upgrade' grant scheme for dwellings**
Description	**Timeframe**	Start: 2015, Expiry:
	Purpose / short description	The scheme (1st call - 2015) aims at implementing large-scale energy upgrading in existing buildings or building units used as dwellings, owned by natural persons living permanently in areas under the control of the Republic of Cyprus. The scheme includes the following three (3) types of investment: A. Integrated energy upgrading of buildings or building units used as dwellings, to achieve at least an energy category B in the energy performance certificate or to achieve at least 40 % energy savings compared to the total energy consumption of the dwelling before the upgrade. B. Integrated energy upgrading of buildings used as dwellings with a view to turning them into nearly zero-energy buildings. C. Implementation of individual energy savings measures in buildings or building units used as permanent dwellings by vulnerable consumers. The public contribution percentage stands at 50 % of the total approved budget of the proposal. The public contribution amount for beneficiaries designated as vulnerable consumers represents 75 %. The energy upgrading grant amount may stand up to EUR 15 000 for each building, or EUR 10 000 for each building unit. Where the space heating/cooling system is to be replaced by a RES system, the grant amount may be increased by EUR 10 000.
	End use category	Residential sector
	Target group	Applications may be filed by natural persons living in areas under the control of the Republic of Cyprus at least in the last six (6) months prior to the date of application.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	(i) Issuance of energy performance certificates and recommendations (ii) Thermal insulation of walls and load-carrying elements (pillars, beams and load-carrying walls) that are part of the envelope, provided that the mean U-value of the walls and these elements does not exceed 0.72W/m2K10. (iii) Thermal insulation of horizontal building elements (floors in a piloti, floors in a cantilever, terraces, roofs) and ceilings that are part of the envelope, exclusive of pilotis above jointly used areas in multi-apartment buildings, provided that the mean U-value of these elements does not exceed 0.63W/m2K. (iv) Replacement of window and door frames, provided that the mean U-value of these frames does not exceed 3.23W/m2K. (v) Purchase and installation of a high energy efficiency boiler fired with liquid or gaseous fuel intended for space heating or water heating (minimum useful efficiency equal to 100 % of the rated useful output: 92 %). (vi) Purchase and installation of a high energy efficiency aerothermal, geothermal or hydrothermal pump intended for the functioning of central space heating and cooling systems. (minimum equipment requirements 11: COP ≥ 4 and EER ≥ 3.7 or as may be modified by the operator).

		(vii) Purchase and installation of a solar water heater or replacement of solar panels and/or a hot water tank. (viii) Purchase and installation of a central solar system for space heating and/or cooling. (ix) Purchase and installation of a biomass boiler for space heating. (x) Replacement of lamps with ones with a higher energy efficiency rating than those already used in the building. (xi) Purchase and installation of a waste energy recovery system. (xii) Purchase and installation of a high efficiency system for cogeneration of heat and power. (xiii) Purchase and installation of smart meters capable of taking real-time recordings and storing data relating to the power consumed in the dwelling as well as any power generated by RES systems. These data must be directly accessible by the user of the building or building unit. (xiv) Purchase and installation/replacement of an outdoor moving shading system. (xv) Purchase and installation/replacement of an outdoor fixed shading system. (xvi) Replacement of standalone split type air conditioners without any high energy efficiency air ducts (minimum equipment requirements: Rated output: up to 12kW, with a minimum seasonal energy efficiency ratio (SEER) of 6.1 and a minimum seasonal coefficient of performance (SCOP) of 4.6 in the 'warmer' heating season (also including Cyprus) and/or at least 4 in 'average' heating season, as defined in Delegated Regulation (EU) No 626/2011.
	Budget and source	EUR 6 800 209 (categories A and B). These sums may be modified, as not all the applications filed have been evaluated yet. EUR 92 561 (category C). These sums may be modified, as not all the applications filed have been evaluated yet. Source: Energy Service of MECIT.
	Implementing organisation	Energy Service of MECIT.
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/ calculating energy savings.**	The methodologies described in Annex E paragraph 16 were applied.
	Final energy savings achieved in 2016.	2 857.1 **TOE**
	Primary energy savings achieved in 2016.	2 857.1 **TOE**
	Expected primary energy savings in 2020	2 857.1 **TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	8 498 **TOE (cumulative final energy savings for 2020)**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**

‘SAVE & UPGRADE’ SCHEME FOR DWELLINGS (CATEGORIES A AND B)							
No	**YEAR OF IMPLEMENTATION**	**NUMBER OF INVESTMENTS**	**Contribution towards the 2016 target. Final consumption (toe)**	**Contribution towards the 2020 primary consumption target (toe)**	**Contribution towards the target referred to in Article 7 for 2020 (toe)**	**GRANT AMOUNT (EUR)**	**EXPECTED DURATION OF INVESTMENT (YEARS)**
1	2015	528	2 369.56	2 369.56	7 218.78	EUR 5 484 194.00	20.00
2	2016	123	454.56	454.56	1 118	EUR 1 316 015.00	20.00
TOTAL		651	2 824.12	2 824.12	8 337	EUR 6 800 209.00	

‘SAVE & UPGRADE’ SCHEME FOR DWELLINGS (CATEGORY C) - VULNERABLE CONSUMERS					
YEAR	Thermal insulation of horizontal building elements	Replacement of window and door frames	Replacement of solar water heater	Thermal insulation of walls	Total budget
2015	14	3	20	3	EUR 54 393.00
2016	6	6	14	2	EUR 38 168.00
TOTAL	20	9	34	5	EUR 92 561.00

‘SAVE & UPGRADE’ SCHEME FOR DWELLINGS - VULNERABLE CONSUMERS							
No	**YEAR OF IMPLEMENTATIO N**	**NUMBER OF INVESTMENTS**	**Contribution towards the 2016 target. Final consumption (toe)**	**Contribution towards the 2020 primary consumption target (toe)**	**Contribution towards the target referred to in Article 7 for 2020 (toe)**	**GRANT AMOUNT (EUR)**	**EXPECTED DURATION OF INVESTMENT (YEARS)**
1	2015	40	21.74	21.74	113.02	EUR 54 393.00	20.00
2	2016	28	11.37	11.37	48	EUR 38 168.00	20.00
		68	33.11	33.11	161	EUR 92 561.00	

10.2 ‘Save & Upgrade’ grant scheme for enterprises

Title of the energy efficiency improvement measure (EEI).		‘Save & Upgrade’ grant scheme for enterprises
Description	**Timeframe**	Start: 2015, Expiry:
	Purpose / short description	This Scheme (1st call - 2015) aims to ensure large-scale energy upgrading in building facilities used by natural or legal persons governed by private law, which are owners or tenants of building facilities and SMEs carrying out an economic activity. The scheme includes the following two (2) types of investment: A. Energy upgrading of the building through a large-scale renovation, to achieve at least an energy category B in the energy performance certificate or to achieve more than 40 % savings in terms of the total energy consumption of the building. B. Energy upgrading of the building into a nearly-zero energy building, in compliance with the criteria laid down in the national legislation. The public contribution percentage stands at **50 %** of the total approved budget of the proposal. The maximum grant amount will be **EUR 200 000.**
	End use category	Tertiary and industry sector
	Target group	Existing buildings in the tertiary and industry sectors
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	(i) Energy audit and/or the relevant technical and financial study required. (ii) Issuance of energy performance certificates and recommendations. (iii) Thermal insulation of walls and load-carrying elements (pillars, beams and load-carrying walls) that are part of the envelope, provided that the mean U-value of the walls and these elements does not exceed 0.72W/m2m2K6. (iv) Thermal insulation of horizontal building elements (floors in a piloti, floors in a cantilever, terraces, roofs) and ceilings that are part of the envelope, exclusive of pilotis above jointly used areas in multi-apartment buildings, provided that the mean U-value of these elements does not exceed 0.63W/m2K. (v) Replacement of window and door frames, provided that the mean U-value of these frames does not exceed 3.23W/m2K. (vi) Purchase and installation of a high energy efficiency boiler fired with liquid or gaseous fuel intended for space heating or water heating (minimum useful efficiency equal to 100 % of the rated useful output: 92 %). (vii) Purchase and installation of a central air conditioning system with an aerothermal, geothermal or hydrothermal pump intended for high efficiency space heating and cooling (minimum equipment requirements: COP ≥ 4 and EER ≥ 3.7). (viii) Purchase and installation of a central solar system for hot water production. (ix) Purchase and installation of a central solar system for space heating and/or cooling. (x) Purchase and installation of a biomass boiler for space heating or hot water production. (xi) Replacement of lamps with ones with a higher energy efficiency rating than those already used in the building. (xii) Purchase and installation of a waste energy recovery system. (xiii) Purchase and installation of a high efficiency system for cogeneration of heat and power. (xiv) Purchase and installation of power savings systems.

		(xv) Purchase and installation of a building energy management system (BEMS) and/or smart meters. (xvi) Purchase and installation of light pipes. (xvii) Thermal insulation of hot water piping. (xviii) Purchase and installation/replacement of an outdoor moving shading system. (xix) Purchase and installation/replacement of an outdoor fixed shading system. (xx) Replacement of standalone split type air conditioners without any high energy efficiency air ducts (minimum equipment requirements: Rated output: up to 12kW, SCOP>4.6 and SEER >6.1).
	Budget and source	EUR 8 980 267 (categories A and B). These sums may be modified, as not all the applications filed have been evaluated yet. Source: Energy Service of MECIT.
	Implementing organisation	Energy Service of MECIT.
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodologies described in Annex E paragraph 17 were applied.
	Final energy savings achieved in 2016.	4 722.9 **TOE**
	Primary energy savings achieved in 2016.	4 722.9 **TOE**
	Expected primary energy savings in 2020	4 722.9 **TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	7 937.9 **TOE (cumulative final energy savings for 2020)**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**

‘SAVE & UPGRADE’ SCHEME FOR UNDERTAKINGS

No	YEAR OF IMPLEMENTATION	NUMBER OF INVESTMENTS	Contribution towards the 2016 target. Final consumption (toe)	Contribution towards the 2020 primary consumption target (toe)	Contribution towards the target referred to in Article 7 for 2020 (toe)	GRANT AMOUNT (EUR)	EXPECTED DURATION OF INVESTMENT (YEARS)
1	2015	45	1 596.06	1 596.06	3 074	EUR 3 044 526.75	20.00
2	2016	74	3 126.86	3 126.86	4 864	EUR 5 935 740.50	20.00
		119	4 722.92	4 722.92	7 937.9	EUR 8 980 267.25	

11. Solar water heater replacement scheme.

Title of the energy efficiency improvement measure (EEI).		Solar water heater replacement scheme.
Description	**Timeframe**	Start: 2015, Expiry: 2016
	Purpose / short description	This scheme aims to provide economic incentives in the form of a State grant for replacing solar water heaters in existing dwellings. The scheme covers investments consisting in purchasing and installing new equipment / materials. The scheme relates only to the replacement of solar hot water production systems in existing private residential units. Subsidised systems should meet specified energy criteria. Also, an installation permit should be obtained from the competent town planning authority, as appropriate. The grant given amounts to: A. EUR 350 per residential unit and per beneficiary, to replace a complete solar hot water production system B. EUR 175 per residential unit and per beneficiary, to replace solar panels in existing solar hot water production systems.
	End use category	Residential sector
	Target group	Natural persons are entitled to apply, insofar as they do not carry out an economic activity and live permanently in areas under the control of the Republic of Cyprus. Beneficiaries must not be in bankruptcy or in the process of being declared bankrupt, and no criminal proceedings must have been brought against them.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	A. Replacement of a complete solar hot water production system. B. Replacement of solar panels in existing solar hot water production systems.
	Budget and source	EUR 177 550 Special Fund for RES and ES
	Implementing organisation	Special Fund for RES and ES
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodology is described in Annex E paragraph 3 (3.2 domestic solar hot water production systems).
	Final energy savings achieved in 2016.	**98.3 TOE**
	Primary energy savings achieved in 2016.	**98.3 TOE**
	Expected primary energy savings in 2020	**98.3 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target	**NO**

	referred to in Article 5 of Directive 2012/27/EU	
	Assumptions	A total of 579 investments were implemented during the implementation of the measure. The assumptions are referred to in the methodology described in Annex E paragraph 3 (3.2 domestic solar hot water production systems).

TABLES LISTING DATA ON THE GRANT SCHEME FOR REPLACING SOLAR WATER HEATERS.

CALCUATION FOR THE SOLAR WATER HEATERS REPLACEMENT SCHEME								
No	**YEAR**	**NUMBER OF SYSTEMS**	**SQUARE METRES OF PANELS**	**ANNUAL AMOUNT OF ENERGY GENERATED (MWhr)**	**ANNUAL AMOUNT OF ENERGY GENERATED (toe)**	**DURATION OF INVESTMENT (YEARS)**	**Average surface area of panels per system**	**Average amount of ENERGY GENERATED (MWhr)**
1	2016	579	1 737	1 142.56	98 260	20	3.00	1.97
TOTAL		579	1 737	1 142.56	98	20		

SOLAR WATER HEATERS REPLACEMENT SCHEME								
No	**YEAR**	**NUMBER OF INVESTMENTS**	**GRANT AMOUNT**	**ENERGY in year of installation toe/year**	**CONTRIBUTION TOWARDS TARGET (2016) FINAL CONSUMPTION**		**ENERGY SAVINGS CONCERNING 2020 TARGET (PRIMARY CONSUMPTION)**	
					toe	**%**	**toe**	**%**
1	2016	579	EUR 177 550.00	98.26	98.26	0.05 %	98.26	0.03 %
TOTAL		**579**	**EUR 177 550**	**98.26**	**98.26**	**0.05 %**	**98.26**	**0.03 %**

12. Horizontal measures (information campaigns, organisation of workshops, etc.) to attain the target referred to in Article 7 of the Directive.

Title of the energy efficiency improvement measure (EEI).		Implementation of horizontal measures aimed at attaining the target referred to in Article 7 EED.
Description	**Timeframe**	Start: 2014, Expiry:
	Purpose / short description	This consists in implementing energy savings information campaigns, carrying out advertising actions, organising workshops, conducting pupils' competitions, etc. All these are organised by MECIT on an annual basis.
	End use category	Residential, tertiary and industry sectors
	Target group	Citizens, self-employed people, workers.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	-
	Budget and source	Not applicable
	Implementing organisation	MECIT
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodologies described in Annex E paragraph 19 were applied.
	Final energy savings achieved in 2016.	**668.25 TOE**
	Primary energy savings achieved in 2016.	**668.25 TOE**
	Expected primary energy savings in 2020	**0 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**495 TOE (cumulative final energy savings for 2020)**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**

TABLES LISTING DATA ON THE IMPLEMENTATION OF HORIZONTAL MEASURES UNDER ARTICLE 7 EED.

	Year of implementation	Description of measure	Sector	Final energy consumption of a person (either for electricity or for electricity and heat) [kWh/a]	Savings factor of the awareness raising campaign [%]	Number of involved persons of a specific target group	Percentage of affected persons of a specific target group	Life time	Total Final Energy Savings [kWh/a]	Total cumulative Final Energy Savings [kWh/a]	Total Final Energy Savings [toe/a]	Total cumulative Final Energy Savings [toe]	Contribution in the target of 2016 (Primary energy savings) [toe]	Contribution in the target of 2020 (Primary energy savings) [toe]
1	2014	School Competition (RES & ES)	Residential	4735	2%	48795	0.4	2	1848183	3696366.11	158.92	317.83	429.07	0.00
2	2014	Distribution of information material (ENERGEIN)	Residential	4735	2%	800	0.4	2	30301	60602.38	2.61	5.21	7.03	0.00
3	2014	Workshops & presentations (Cyprus Energy Agency)	Residential	4735	2%	500	0.4	2	18938	37876.48	1.63	3.26	4.40	0.00
4	2014	Exhibitions (Savenergy)	Residential	4735	2%	9500	0.4	2	359826	719653.20	30.94	61.88	83.54	0.00
5	2014	Websites (Energy Service, energein, EAC, TSO, CEA etc.)	Residential	4735	2%	10000	0.4	2	378764	757529.69	32.57	65.14	87.93	0.00
6	2014	Training programs and certification exams (energy auditors, EPBD etc.)	Residential	4735	2%	250	0.4	2	9469	18938.24	0.81	1.63	2.20	0.00
TOTAL RESIDENTIAL SECTOR						**69845**			**2645483**	**5290966.10**	**227.47**	**454.94**	**614.17**	
7	2014	Distribution of information material (ENERGEIN)	Tertiary	4735	2%	200	0.4	2	7575.30	15150.59	0.65	1.30	1.76	0.00
8	2014	Inspections in public buildings	Tertiary - Public Sector	4735	2%	100	0.4	2	3787.65	7575.30	0.33	0.65	0.88	0.00
9	2014	Workshops & presentations (ETEK, OEB, KEBE etc.)	Tertiary	4735	2%	150	0.4	2	5681.47	11362.95	0.49	0.98	1.32	0.00
10	2014	Exhibitions (Savenergy)	Tertiary	4735	2%	500	0.4	2	18938.24	37876.48	1.63	3.26	4.40	0.00
11	2014	Websites (Energy Service, energein, EAC, TSO, CEA etc.)	Tertiary	4735	2%	4800	0.4	2	181807.13	363614.25	15.63	31.27	42.21	0.00
12	2014	Training programs and certification exams	Tertiary	4735	2%	100	0.4	2	3787.65	7575.30	0.33	0.65	0.88	0.00

		(energy auditors, EPBD etc.)												
TOTAL TERTIARY SECTOR						**5850**			**221577.43**	**443154.87**	**19.05**	**38.10**	**51.44**	
13	2014	Workshops & presentations (ETEK, OEB, KEBE etc.)	Industrial	4735	2%	50	0.4	2	1893.82	3787.65	0.16	0.33	0.44	0.00
14	2014	Websites (Energy Service, energein, EAC, TSO, CEA etc.)	Industrial	4735	2%	200	0.4	2	7575.30	15150.59	0.65	1.30	1.76	0.00
15	2014	Training programs and certification exams (energy auditors, EPBD etc.)	Industrial	4735	2%	50	0.4	2	1893.82	3787.65	0.16	0.33	0.44	0.00
TOTAL INDUSTRIAL SECTOR						**300**			**11362.95**	**22725.89**	**0.98**	**1.95**	**2.64**	
TOTAL									2878423.4	5756846.86	247.50	495.00	668.25	

13. Measures aimed at attaining the target referred to in Article 5 EED.

Title of the energy efficiency improvement measure (EEI).		Implementation of measures aimed at attaining the target referred to in Article 5 EED.
Description	**Timeframe**	Start: 2014, Expiry:
	Purpose / short description	This measure consists in implementing major renovation and individual energy savings measures in public sector buildings, as well as measures intended to improve user behaviour with a view to a more rational use of energy in public buildings.
	End use category	Tertiary (public) sector
	Target group	Public sector buildings and staff.
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	-
	Budget and source	Not applicable
	Implementing organisation	MECIT
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodologies described in Annex E paragraph 20 were applied.
	Final energy savings achieved in 2016.	**345.8 TOE**

	Primary energy savings achieved in 2016.	**345.8 TOE**
	Expected primary energy savings in 2020	**132.8 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**YES**

TABLES LISTING DATA ON THE IMPLEMENTATION OF MEASURES TO ATTAIN THE TARGET REFERRED TO IN ARTICLE 5 EED.

ENERGY SAVINGS CALCULATIONS FOR THE ENERGY UPGRADING OF PUBLIC SECTOR BUILDINGS UNDER A CATEGORY OR IMPLEMENTATION OF INDIVIDUAL MEASURES IN PUBLIC BUILDINGS - ARTICLE 5

	YEAR OF IMPLEMENTATION	DESCRIPTION OF MEASURES	PRIMARY ENERGY SAVINGS IN kWh/YEAR	Contribution towards the 2016 end use target (toe)	Contribution in primary consumption 2016 (toe)	Contribution in primary consumption 2020 (toe)	Contribution towards the target referred to in Article 5 (GWh)	EXPECTED LIFECYCLE OF THE MEASURE (YEARS)
1	2014	Energy savings from major renovation and individual energy savings measures.	0.00	0.00	0.00	0.00	0.00	0
2		Energy savings from measures intended to improve user behaviour with a view to a more rational use of energy in public buildings.	3 521 558.27	0.00	0.00	0.00	3.52	1
3	2015	Energy savings from major renovation and individual energy savings measures.	1 096 715.00	94.32	94.32	94.32	1.10	25
4		Energy savings from measures intended to improve user behaviour with a view to a more rational use of energy in public buildings.	3 953 335.54	0.00	0.00	0.00	3.95	1
5	2016	Energy savings from major renovation and individual energy savings measures.	447 633.50	38.50	38.50	38.50	0.45	25
6		Energy savings from measures intended to improve user behaviour with a view to a more rational use of energy in public buildings.	2 476 319.92	212.96	212.96	0.00	2.48	1

TOTAL	11 495 562.23	345.78	345.78	132.81	11.50	0.00

14. REPLACEMENT OF ENERGY-RELATED PRODUCTS (washing machines, air conditioners, refrigerators, etc.)

Title of the energy efficiency improvement measure (EEI).		REPLACEMENT OF ENERGY-RELATED PRODUCTS (DIRECTIVE 2010/30/EC ON THE INDICATION BY LABELLING AND STANDARD PRODUCT INFORMATION OF ENERGY AND OTHER RESOURCES BY ENERGY-RELATED PRODUCTS).
Description	**Timeframe**	Start: 2010, Expiry:
	Purpose / short description	This consists in replacing domestic appliances in the residential sector.
	End use category	Residential sector
	Target group	Appliances in the residential sector
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Legislation on the labelling of domestic appliances (Ecodesign).
	Budget and source	Not applicable
	Implementing organisation	-
	Competent monitoring authority	Energy Service of MECIT.
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodologies described in Annex E paragraph 21 were applied.
	Final energy savings achieved in 2016.	**12 802.3 TOE**
	Primary energy savings achieved in 2016.	**12 802.3 TOE**
	Expected primary energy savings in 2020	**12 275.2 TOE**
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	**NO**
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	**NO**

TABLES LISTING DATA ON THE REPLACEMENT OF HOME APPLIANCES

Aggregate date on all appliances

Measures	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		ENERGY SAVINGS TOWARDS IN 2016 PRIMARY CONSUMPTION	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
Household dishwashers (Regulation (EU) No 1016/2010)	552	0.30 %	552	552	0.15 %
Household refrigerators (Regulation (EC) No 1060/2009)	1 620	0.88 %	1 620	1 620	0.43 %
Household freezers	614	0.33 %	614	614	0.16 %
Household refrigerators and freezers	1 698	0.92 %	1 698	1 698	0.45 %
Air conditioners	2 878	1.56 %	2 878	2 878	0.77 %
Household washing machines	1 297	0.70 %	1 297	1 548	0.41 %
Household tumble dryer	1 842	1.00 %	1 842	1 842	0.49 %
Television sets	919	0.50 %	919	207	0.06 %
Electric ovens	1 024	0.55 %	1 024	1 024	0.27 %
Vacuum cleaners	102	0.05 %	102	37	0.01 %
Diesel boiler	184	0.10 %	184	184	0.05 %
Gas boiler	73	0.04 %	73	73	0.02 %
Total savings (kWh)	**12 802**	**6.92 %**	**12 802**	**12 275**	**3.27 %**

Household dishwashers

REPLACEMENT																		
Household dishwashers				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	A	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 12 years				**2010**	11 959	**2010**	5 980	0	0	0	0	0	0	4 186	1 381 380	1 381 380	151 952	35
Imports				**2011**	10 903	**2011**	5 452	0	0	0	0	0	0	4 362	1 439 328	1 439 328	158 326	37
	From EU	Outside EU	**Total**	**2012**	8 792	**2012**	4 396	88	20 222	440	114 296	2 418	701 162	1 451	478 724	1 314 404	159 856	37
2010	9 531	2 428	11 959	**2013**	6 918	**2013**	3 459	173	39 779	346	89 934	1 902	551 711	1 037.7	342 441	1 023 864	129 176	30
2011	8 313	1 534	9 847	**2014**	6 725	**2014**	3 363	336	77 349	673	174 876	2018	585 162	336.3	110 979	948 366	136 504	32
2012	7 096	640	7 736	**2015**	7 054	**2015**	3 527	423	97 345	1 658	430 999	1 446	419 360			947 705	165 843	39
2013			6 099	**2016**	7 077	**2016**	3 539	425	97 676	1 663	432 466	1 451	420 787			950 929	166 407	39
2014			7 350	**2017**	8 500	**2017**	4 250	510	117 300	1 998	519 350	1 743	505 325			1 141 975	199 839	46
2015			6 758	**2018**	9 775	**2018**	4 888	587	134 909	2 297	597 314	2004	581 183			131 3406	229 839	53
2016			7 395	**2019**	11 200	**2019**	5 600	672	154 560	2 632	684 320	2 296	665 840			838 880	263 318	61
				2020	11 200	**2020**	6 500	780	179 400	3 055	794 300	2 665	772 850			973 700	305 637	71

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	5 980	44	263 120	61	**96**
2011	5 452	44	239 888	56	**92**
2012	4 396	44	193 424	45	**82**
2013	3 459	44	152 196	35	**65**
2014	3 363	44	147 972	34	**66**
2015	3 527	44	155 188	36	**75**
2016	3 539	44	155 716	36	**75**
2017	4 250	44	187 000	43	**90**
2018	4 888	44	215 072	50	**103**
2019	4 888	44	215 072	50	**111**
2020	4 888	44	215 072	50	**121**

ENERGY SAVINGS PER YEAR (TOE)															
Household refrigerators		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
1	**2010**	96	96	96	96	96	96	96	96	96	96	96	96	0	0
2	**2011**	0	92	92	92	92	92	92	92	92	92	92	92	92	0
3	**2012**	0	0	82	82	82	82	82	82	82	82	82	82	82	82
4	**2013**	0	0	0	65	65	65	65	65	65	65	65	65	65	65
5	**2014**	0	0	0	0	66	66	66	66	66	66	66	66	66	66
6	**2015**	0	0	0	0	0	75	75	75	75	75	75	75	75	75
7	**2016**	0	0	0	0	0	0	75	75	75	75	75	75	75	75
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		96	189	271	336	402	477	552	552	552	552	552	552	455	363

Household refrigerators

REPLACEMENT																		
Household refrigerators				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	A	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
				2010	24 963	**2010**	12 482	0	0	0	0	1 248	146 034	8 737	1 310 558	1 456 591	333 556	77
Lifecycle			15 years	**2011**	2 4085	**2011**	12 042	0	0	0	0	2 408	281 789	9 634	1 445 070	1 726 859	394 360	92
Imports				**2012**	21 716	**2012**	10 858	0	0	1 303	109 449	5 429	63 5193	4 778	716 628	1 461 270	352 724	82
	From EU	Outside EU	**Total**	**2013**	17 971	**2013**	8 986	0	0	1 348	113 217	4 942	578 217	2 696	404 348	1 095 782	270 023	63
2010	9 882	15 081	24 963	**2014**	20 441	**2014**	10 220	0	0	3 066	257 550	6 132	717 462	1 022	153 304	1 128 316	306 424	71
2011	12 930	10 780	23 206	**2015**	18 542	**2015**	9 271	0	0	4 635	389 372	5 562	650 807			1 040 178	314 501	73
2012	13 520	6 702	20 226	**2016**	14 421	**2016**	7 211	0	0	5 047	42 3977	2 163	253 089			677 066	242 230	56
2013			15 716	**2017**	21 000	**2017**	10 500	0	0	7 140	599 760	3 360	393 120			992 880	350 381	81
2014			25 165	**2018**	23 000	**2018**	11 500	0	0	7 820	656 880	3 680	430 560			1 087 440	383 750	89
2015			11 918	**2019**	25 000	**2019**	12 500	0	0	8 500	714 000	4 000	468 000			714 000	417 120	97
2016			16 924	**2020**	28 000	**2020**	14 000	0	0	9 520	799 680	4 480	524 160			799 680	467 174	108

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	12 482	67	836 260.5	194	**272**
2011	12 042	67	806 830.75	187	**279**
2012	10 858	67	727 486	169	**251**
2013	8 986	67	602 028.5	140	**202**
2014	10 220	67	684 756.75	159	**230**
2015	9 271	67	621 140.25	144	**217**
2016	7 211	67	483 103.5	112	**168**
2017	10 500	67	703 500	163	**245**
2018	11 500	67	770 500	179	**268**
2019	12 500	67	837 500	194	**291**
2020	14 000	67	938 000	218	**326**

ENERGY SAVINGS PER YEAR (TOE)														
Household refrigerators		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	272	272	272	272	272	272	272	272	272	272	272	272	272
2	**2011**	0	279	279	279	279	279	279	279	279	279	279	279	279
3	**2012**	0	0	251	251	251	251	251	251	251	251	251	251	251
4	**2013**	0	0	0	202	202	202	202	202	202	202	202	202	202
5	**2014**	0	0	0	0	230	230	230	230	230	230	230	230	230
6	**2015**	0	0	0	0	0	217	217	217	217	217	217	217	217
7	**2016**	0	0	0	0	0	0	168	168	168	168	168	168	168
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		272	551	801	1 004	1 234	1 451	1 620	1 620	1 620	1 620	1 620	1 620	1 620

Household freezers

REPLACEMENT																		
Household freezers				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	A	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 15 years				**2010**	13 448	**2010**	6 724	336	36 982	3 362	470 680	3 026	605 160			1 112 822	360 944	84
Imports				**2011**	10 426	**2011**	5 213	261	28 670	2 606	364 893	2 346	469 148			862 710	279 820	65
	From EU	Outside EU	**Total**	**2012**	5 252	**2012**	2 626	131	14 442	1 313	183 803	1 182	236 318			434 562	140 950	33
2010	10 215	3 233	13 448	**2013**	2 697	**2013**	1 349	67	7 417	674	94 395	607	121 365			223 176.8	72 387	17
2011	4 297	3 106	7 403	**2014**	2 859	**2014**	1 430	71	7 862	715	100 065	643	128 655			236 582.3	76 736	18
2012	1 687	1 413	3 100	**2015**	3 909	**2015**	1 954	98	10 748	977	136 798	879	175 883			323 428	104 904	24
2013			2 294	**2016**	3 802	**2016**	1 901	95	10 456	951	133 070	855	171 090			314 616	102 046	24
2014			3 424	**2017**	6 000	**2017**	3 000	750	82 500	1 680	235 200	300	60 000			377 700	162 888	38
2015			4 393	**2018**	7 000	**2018**	3 500	875	96 250	1 960	274 400	350	70 000			440 650	190 036	44
2016			3 211	**2019**	8 000	**2019**	4 000	1 000	110 000	2 240	313 600	400	80 000			503 600	217 184	50
				2020	9 000	**2020**	4 500	1 125	123 750	2 520	352 800	450	90 000			566 550	244 332	57

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	6 724	71	477 404	111	**195**
2011	5 213	71	370 105	86	**151**
2012	2 626	71	186 428	43	**76**
2013	1 349	71	95 744	22	**39**
2014	1 430	71	101 495	24	**41**
2015	1 954	71	138 752	32	**57**
2016	1 901	71	134 971	31	**55**
2017	3 000	71	213 000	49	**87**
2018	3 500	71	248 500	58	**102**
2019	4 000	71	284 000	66	**116**
2020	4 500	71	319 500	74	**131**

ENERGY SAVINGS PER YEAR (TOE)														
Household freezers		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	195	195	195	195	195	195	195	195	195	195	195	195	195
2	**2011**	0	151	151	151	151	151	151	151	151	151	151	151	151
3	**2012**	0	0	76	76	76	76	76	76	76	76	76	76	76
4	**2013**	0	0	0	39	39	39	39	39	39	39	39	39	39
5	**2014**	0	0	0	0	41	41	41	41	41	41	41	41	41
6	**2015**	0	0	0	0	0	57	57	57	57	57	57	57	57
7	**2016**	0	0	0	0	0	0	55	55	55	55	55	55	55
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		195	346	422	461	502	559	614	614	614	614	614	614	614

Household refrigerators and freezers

Refrigerators and freezers				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	A	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 15 years				**2010**	19 258	**2010**	9 629	481	52 960	4 815	674 030	4 333	866 610			1 593 600	516 885	120
Imports				**2011**	21 227	**2011**	10 614	531	58 374	5 307	742 945	4 776	955 215			1 756 534	569 733	132
	From EU	Outside EU	**Total**	**2012**	20 512	**2012**	10 256	513	56 408	5 128	717 920	4 615	923 040			1 697 368	550 542	128
2010	6 766	12 502	19 258	**2013**	16 114	**2013**	8 057	403	44 314	4 029	563 990	3 626	725 130			1 333 434	432 500	100
2011	11 066	12 130	23 196	**2014**	13 066	**2014**	6 533	327	35 932	3 267	457 310	2 940	587 970			1 081 212	350 691	81
2012	9 352	8 476	17 828	**2015**	12 334	**2015**	6 167	308	33 919	3 084	431 690	2 775	555 030			1 020 639	331 045	77
2013			14 400	**2016**	16 698	**2016**	8 349	417	45 918	4 174	584 413	3 757	751 387.5			1 381 718	448 161	104
2014			11 732	**2017**	20 500	**2017**	10 250	2 562.5	281 875	6 048	846 650	1 948	389 500			1 518 025	616 066	143
2015			12 936	**2018**	20 500	**2018**	10 250	7 175	789 250	3 075	430 500	1 948	389 500			1 609 250	717 090	167
2016			20 459	**2019**	20 500	**2019**	10 250	8 200	902 000	2050	287 000	1 948	389 500			1 578 500	717 090	167
				2020	20 500	**2020**	10 250	8 200	902 000	2050	287 000	1 948	389 500			1 578 500	717 090	167

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	9 629	69	664 401	154	**274**
2011	10 614	69	732 332	170	**302**
2012	10 256	69	707 664	164	**292**
2013	8 057	69	555 933	129	**230**
2014	6 533	69	450 777	105	**186**
2015	6 167	69	425 523	99	**176**
2016	8 349	69	576 064	134	**238**
2017	10 250	69	707 250	164	**307**
2018	10 250	69	707 250	164	**331**
2019	10 250	69	707 250	164	**331**
2020	10 250	69	707 250	164	**331**

ENERGY SAVINGS PER YEAR (TOE)														
Household refrigerators and freezers		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	274	274	274	274	274	274	274	274	274	274	274	274	274
2	**2011**	0	302	302	302	302	302	302	302	302	302	302	302	302
3	**2012**	0	0	292	292	292	292	292	292	292	292	292	292	292
4	**2013**	0	0	0	230	230	230	230	230	230	230	230	230	230
5	**2014**	0	0	0	0	186	186	186	186	186	186	186	186	186
6	**2015**	0	0	0	0	0	176	176	176	176	176	176	176	176
7	**2016**	0	0	0	0	0	0	238	238	238	238	238	238	238
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		274	577	869	1 098	1 284	1 460	1 698	1 698	1 698	1 698	1 698	1 698	1 698

Air conditioners

REPLACEMENT																				
Air conditioners				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	A	kWh/ year	B	kWh/year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 15 years				**2010**	32 409	**2010**	16 205				0	1 620	356 499	6 482	2 009 358	8 102	3 240 900	5 606 757	1 682 027	391
Imports				**2011**	35 481	**2011**	17 741				0	1 774	390 291	7 096	2 199 822	8 870	3 548 100	6 138 213	1 841 464	428
	From EU	Outside EU	**Total**	**2012**	34 914	**2012**	17 457			873	144 020	1 746	384 054	8 729	2 705 835	6 110	2 443 980	5 677 889	1 727 850	401
2010			33 000	**2013**	29 430	**2013**	14 715			2 207	36 4190	5 150	1 133 036	7 357	2 280 786			3 778 012	1 195 316	278
2011			38 762	**2014**	36 242	**2014**	18 121			2 718	448 489	11 778	2 591 267	3 624	1 123 487			4 163 242	1 325 216	308
2012			32 042	**2015**	50 599	**2015**	25 300			3 795	626 163	16 445	3 617 829	5 060	1 568 569			5 812 560	1 850 216	430
2013			27 753	**2016**	68 349	**2016**	34 174			17 087	2 819 376	17 087	3 759 168	3 417	1 059 402			7 637 945	2 770 677	643
2014			45 252	**2017**	60 000	**2017**	30 000			15 000	2 475 000	15 000	3 300 000	3 000	930 000			6 705 000	2 432 250	565
2015			56 578	**2018**	60 000	**2018**	30 000	4 500	630 000	13 500	2 227 500	12 000	2 640 000					4 867 500	2 416 350	561
2016			80 119	**2019**	60 000	**2019**	30 000	7 500	1 050 000	16 500	2 722 500	6 000	1 320 000					5 092 500	2 253 075	523
				2020	60 000	**2020**	30 000	13 500	1 890 000	16 500	2 722 500							4 612 500	2 319 075	538

ENERGY SAVINGS PER YEAR (TOE)														
Air conditioners		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	391	391	391	391	391	391	391	391	391	391	391	391	391
2	**2011**	0	428	428	428	428	428	428	428	428	428	428	428	428
3	**2012**	0	0	401	401	401	401	401	401	401	401	401	401	401
4	**2013**	0	0	0	278	278	278	278	278	278	278	278	278	278
5	**2014**	0	0	0	0	308	308	308	308	308	308	308	308	308
6	**2015**	0	0	0	0	0	430	430	430	430	430	430	430	430
7	**2016**	0	0	0	0	0	0	643	643	643	643	643	643	643
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		391	818	1 219	1 497	1 805	2 234	2 878	2 878	2 878	2 878	2 878	2 878	2 878

Household washing machines

REPLACEMENT																
Household washing machines				Estimated sales		Estimated replacements		A+++	kWh/ year	A++	kWh/ year	A+	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 12 years				**2010**	36 794	**2010**	18 397	920	147 176	9 199	1 655 730	8 279	1 655 730	3 458 636	659 716	153
Imports				**2011**	37 778	**2011**	18 889	944	151 112	9 445	1 700 010	8 500	1 700 010	3 551 132	67 7360	157
	From EU	Outside EU	**Total**	**2012**	35 402	**2012**	17 701	885	141 608	8 851	1 593 090	7 965	1 593 090	3 327 788	634 758	147
2010	25 905	9 889	36 794	**2013**	27 045	**2013**	13 522.25	2 704	432 712	6 761	1 217 003	4 057	811 335	2 461 050	531 965	124
2011	31 102	7 660	38 762	**2014**	24 858	**2014**	12 428.75	3 729	596 580	6 214	1 118 588	2 486	497 150	2 212 318	517 782	120
2012	26 580	5 462	32 042	**2015**	26 475	**2015**	13 237.25	5 295	847 184	6 619	1 191 353	1 324	264 745	2 303 282	58 2174	135
2013			22 047	**2016**	25 617	**2016**	12 808.25	6 404	1 024 660	6 404	1 152 743			2 177 403	593 022	138
2014			27 668	**2017**	35 000	**2017**	17 500	14 000	2 240 000	2 625	472 500	875	175 000	2 887 500	849 975	197
2015			25 281	**2018**	35 000	**2018**	17 500	14 000	2 240 000	2 625	472 500	875	175 000	2 887 500	849 975	197
2016			25 952	**2019**	35 000	**2019**	17 500	14 000	2 240 000	2 625	472 500	875	175 000	2 887 500	849 975	197
				2020	35 000	**2020**	17 500	14 000	2 240 000	2 625	472 500	875	175 000	2 887 500	849 975	197

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	18 397	13	239 161	56	**209**
2011	18 889	13	245 557	57	**214**
2012	17 701	13	230 113	53	**201**
2013	13 522.25	13	175 789	41	**164**
2014	12 428.75	13	161 574	38	**158**
2015	13 237.25	13	172 084	40	**175**
2016	12 808.25	13	166 507	39	**176**
2017	17 500	13	227 500	53	**250**
2018	17 500	13	227 500	53	**250**
2019	17 500	13	227 500	53	**250**
2020	17 500	13	227 500	53	**250**

ENERGY SAVINGS PER YEAR (TOE)														
Household washing machines		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	209	209	209	209	209	209	209	209	209	209	209	209	0
2	**2011**	0	214	214	214	214	214	214	214	214	214	214	214	214
3	**2012**	0	0	201	201	201	201	201	201	201	201	201	201	201
4	**2013**	0	0	0	164	164	164	164	164	164	164	164	164	164
5	**2014**	0	0	0	0	158	158	158	158	158	158	158	158	158
6	**2015**	0	0	0	0	0	175	175	175	175	175	175	175	175
7	**2016**	0	0	0	0	0	0	176	176	176	176	176	176	176
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		209	423	624	788	946	1 121	1 297	1 297	1 297	1 297	1 297	1 297	1 297

Household tumble dryer

REPLACEMENT																		
Household tumble dryers				Estimated sales		Estimated replacements		A++	kWh/ year	A+	kWh/ year	A	kWh/ year	B	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 12 years				**2010**	35 794	**2010**	17 897					8 949	2 684 550	8 949	3 131 975	5 816 525	715 880	166
Imports				**2011**	36 774	**2011**	18 387					9 194	2 758 050	9 194	3 217 725	5 975 775	735 480	171
	From EU	Outside EU	**Total**	**2012**	33 685	**2012**	16 842			1 684	336 845	8 421	2 526 338	6 737	2 357 915	5 221 098	732 638	170
2010	25 905	9 889	35 794	**2013**	16 829	**2013**	8 415			1 262	252 435	4 207	1 262 175	2 945	1 030 776	2 545 386	380 756	88
2011	30 469	7 285	37 754	**2014**	4 732	**2014**	2 366	355	53 235	710	141 960	946	283 920	355	124 215	603 330	131 313	30
2012	24 154	5 465	29 615	**2015**	5 968	**2015**	2 984	448	67 140	895	179 040	1 194	358 080	448	156 660	760 920	165 612	38
2013			4 043	**2016**	7 231	**2016**	3 615	542	81 343.13	1 085	216 915	1 446	477 213	542	189 800.6	965 271.8	207 153.8	48
2014			5 421	**2017**	34 000	**2017**	17 000	2 550	382 500	5 100	1 020 000	6 800	2 040 000	2 550	892 500	4 335 000	943 500	219
2015			6 515	**2018**	35 000	**2018**	17 500	2 625	393 750	5 250	1 050 000	7 000	2 100 000	2 625	918 750	4 462 500	971 250	226
2016			7 946	**2019**	36 000	**2019**	18 000	5 400	810 000	7 200	1 440 000	5 400	1 620 000			3 870 000	1 152 000	267
				2020	36 000	**2020**	18 000	5 400	810 000	7 200	1 440 000	5 400	1 620 000			3 870 000	1 152 000	267

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	17 897	69	1 234 893	287	**453**
2011	18 387	69	1 268 703	295	**465**
2012	16 842.25	69	1 162 115	270	**440**
2013	8 414.5	69	580 601	135	**223**
2014	2 366	69	163 254	38	**68**
2015	2 984	69	205 896	48	**86**
2016	3 615.25	69	249 452	58	**106**
2017	17 000	69	1 173 000	272	**491**
2018	17 500	69	1 207 500	280	**506**
2019	18 000	69	1 242 000	288	**556**
2020	18 000	69	1 242 000	288	**556**

ENERGY SAVINGS PER YEAR (TOE)														
Household tumble dryers		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	453	453	453	453	453	453	453	453	453	453	453	453	0
2	**2011**	0	465	465	465	465	465	465	465	465	465	465	465	465
3	**2012**	0	0	440	440	440	440	440	440	440	440	440	440	440
4	**2013**	0	0	0	223	223	223	223	223	223	223	223	223	223
5	**2014**	0	0	0	0	68	68	68	68	68	68	68	68	68
6	**2015**	0	0	0	0	0	86	86	86	86	86	86	86	86
7	**2016**	0	0	0	0	0	0	106	106	106	106	106	106	106
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		453	918	1 358	1 582	1 650	1 736	1 842	1 842	1 842	1 842	1 842	1 842	1 842

Television sets

Replacement																		
Television sets				Estimated sales		Estimated replacements		A++	kWh/ year	A+	kWh/ year	A	kWh/ year	B	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 5 years				**2010**	32 809	**2010**	16 405					6 562	590 562	9 843	1 151 596	1 742 158	522 647	121
Imports				**2011**	31 125	**2011**	15 563					6 225	560 250	9 338	1 092 488	1 652 738	495 821	115
	From EU	Outside EU	**Total**	**2012**	22 157	**2012**	11 078					5 539	498 521	5 539	648 078	1 146 599	343 980	80
2010	10 961	7 827	32 809	**2013**	26 590	**2013**	13 295					7 312	658 102.5	5 983	699 982	1 358 084	407 425	95
2011	8 875	4 765	29 441	**2014**	45 841	**2014**	22 921			3 438	240 665.3	11 460	1 031 423	8 022	938 594	2 210 682	648 764.8	151
2012	3 828	5 795	14 872	**2015**	50 940	**2015**	25 470			3 820	267 432.4	12 735	1 146 139	8 914	1 042 986	2 456 557	720 921.3	167
2013			38 308	**2016**	48 464	**2016**	24 232			9 693	678 489	12 116	1 090 429	2 423	283 511	2 052 429	575 019.4	134
2014			53 374	**2017**	11 500	**2017**	5 750	288	14 375	2 587.5	181 125	2 588	232 875	288	33 638	462 013	130 180	30
2015			48 505	**2018**	13 200	**2018**	6 600	330	16 500	2 970	207 900	2 970	267 300	330	38 610	491 700	14 9424	35
2016			48 422	**2019**	15 200	**2019**	7 600	380	19 000	3 420	239 400	3 420	307 800	380	44 460	566 200	172 064	40
				2020	17 000	2020	8 500	425	21 250	3 825	267 750	3 825	344 250	425	49 725	633 250	192 440	45

NEW INSTALLATION					
Estimated new installations		Savings per appliance/year (kWh)	Total savings/year (kWh)	Total savings/year (TOE)	**TOTAL SAVINGS FROM REPLACEMENS AND NEW INSTALLATIONS (TOE)**
2010	16 405	13	213 259	50	**171**
2011	15 563	13	202 313	47	**162**
2012	11 078	13	144 017	33	**113**
2013	13 295	13	172 835	40	**135**
2014	22 921	13	297 967	69	**220**
2015	25 470	13	331 107	77	**244**
2016	24 232	13	315 013	73	**207**
2017	5 750	13	74 750	17	**48**
2018	6 600	13	85 800	20	**55**
2019	7 600	13	98 800	23	**63**
2020	8 500	13	110 500	26	**70**

ENERGY SAVINGS PER YEAR (TOE)														
Television sets		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	171	171	171	171	171	0	0	0	0	0	0	0	0
2	**2011**	0	162	162	162	162	162	0	0	0	0	0	0	0
3	**2012**	0	0	113	113	113	113	113	0	0	0	0	0	0
4	**2013**	0	0	0	135	135	135	135	135	0	0	0	0	0
5	**2014**	0	0	0	0	220	220	220	220	220	0	0	0	0
6	**2015**	0	0	0	0	0	244	244	244	244	244	0	0	0
7	**2016**	0	0	0	0	0	0	207	207	207	207	207	0	0
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		171	333	446	581	801	874	919	806	671	451	207	0	0

Household electric ovens

Replacement														
Electric ovens				Estimated sales		Estimated replacements		A+	kWh/ year	A	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 12				**2010**	25 000	**2010**	12 500	3 750	412 500	8 750	1 400 000	1 812 500	374 125	87
Imports				**2011**	26 500	**2011**	13 250	3 975	437 250	9 275	1 484 000	1 921 250	396 573	92
	From EU	Outside EU	**Total**	**2012**	30 000	**2012**	15 000	4 500	495 000	10 500	1 680 000	2 175 000	448 950	104
2010			25 000	**2013**	39 876	**2013**	19 938	5 981	657 945.8	13 956	2 233 028	2 890 974	596 737	139
2011			28 000	**2014**	52 944	**2014**	26 472	7 942	873 567.8	18 530	2 964 836	3 838 404	792 299	184
2012			32 000	**2015**	55 660	**2015**	27 830	8 349	918 390	19 481	3 116 960	4 035 350	832 952	193
2013			47 751	**2016**	64 721	**2016**	32 361	9 708	1 067 897	22 652	3 624 376	4 692 273	968 550	225
2014			58 136	**2017**	70 000	**2017**	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243
2015			53 184	**2018**	70 000	**2018**	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243
2016			76 258	**2019**	70 000	**2019**	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243
				2020	70 000	2020	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243
				2021	70 000	**2021**	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243
				2022	70 000	**2022**	35 000	10 500	1 155 000	24 500	3 920 000	5 075 000	1 047 550	243

ENERGY SAVINGS PER YEAR (TOE)														
Household electric ovens		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	**2010**	87	87	87	87	87	87	87	87	87	87	87	87	0
2	**2011**	0	92	92	92	92	92	92	92	92	92	92	92	92
3	**2012**	0	0	104	104	104	104	104	104	104	104	104	104	104
4	**2013**	0	0	0	139	139	139	139	139	139	139	139	139	139
5	**2014**	0	0	0	0	184	184	184	184	184	184	184	184	184
6	**2015**	0	0	0	0	0	193	193	193	193	193	193	193	193
7	**2016**	0	0	0	0	0	0	225	225	225	225	225	225	225
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		87	179	283	422	606	799	1 024	1 024	1 024	1 024	1 024	1 024	1 024

Vacuum cleaners

Vacuum cleaners				Estimated sales		Estimated replacements		A	kWh/ year	B	kWh/ year	C	kWh/ year	D	kWh/ year	E	kWh/ year	F	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 5 years				**2010**	40 000	**2010**	20 000					0	0	0	0	0	0	0	0	0	0	0
Imports				**2011**	40 000	**2011**	20 000					0	0	0	0	0	0	0	0	0	0	0
	From EU	Outside EU	**Total**	**2012**	40 000	**2012**	20 000					0	0	0	0	0	0	0	0	0	0	0
2010	10 961	7 827	40 000	**2013**	38 878	**2013**	19 439					0	0	0	0	0	0	0	0	0	0	0
2011	8 875	4 765	40 000	**2014**	42 784	**2014**	21 392					0	0	0	0	0	0	0	0	0	0	0
2012	3 828	5 795	40 000	**2015**	48498	**2015**	24249					2425	96995	4850	223089	7275	378281	12 124	703 214	1 401 578	280 315.6	65
2013			37 755	**2016**	47 667	**2016**	23 833	14 300	4 003 98	2 860	97 239	3 813	152 533	953	43 853	238	12 393	1 430	82 940	789 357	157 871.4	37
2014			47 813	**2017**	45 000	**2017**	22 500	13 500	378 000	2 700	91 800	3 600	144 000	900	41 400	225	11 700	1 350	78 300	745 200	149 040	35
2015			49 182	**2018**	45 000	**2018**	22 500	13 500	378 000	2 700	91 800	3 600	144 000	900	41 400	225	11 700	1 350	78 300	745 200	149 040	35
2016			46 151	**2019**	45 000	**2019**	22 500	13 500	378 000	2 700	91 800	3 600	144 000	900	41 400	225	11 700	1 350	78 300	745 200	149 040	35
				2020	45 000	2020	22 500	13 500	378 000	2 700	91 800	3 600	144 000	900	41 400	225	11 700	1 350	78 300	745 200	149 040	35

ENERGY SAVINGS PER YEAR (TOE)														
Vacuum cleaners		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**2011**	0	0	0	0	0	0	0	0	0	0	0	0	0
3	**2012**	0	0	0	0	0	0	0	0	0	0	0	0	0
4	**2013**	0	0	0	0	0	0	0	0	0	0	0	0	0
5	**2014**	0	0	0	0	0	0	0	0	0	0	0	0	0
6	**2015**	0	0	0	0	0	65	65	65	65	65	0	0	0
7	**2016**	0	0	0	0	0	0	37	37	37	37	37	0	0
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	65	102	102	102	102	37	0	0

Household diesel boilers

Replacement																		
Household diesel boilers				Estimated sales		Estimated replacements		A++	kWh/ year	A+	kWh/ year	A	kWh/ year	B	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 20 years				**2010**	1 050	**2010**	525					0	0	0	0	0	0	0
Imports				**2011**	1 075	**2011**	538					0	0	0	0	0	0	0
	From EU	Outside EU	**Total**	**2012**	1 050	**2012**	525					0	0	0	0	0	0	0
2010	10 961	7 827	1 050	**2013**	1 000	**2013**	500					0	0	0	0	0	0	0
2011	8 875	4 765	1 100	**2014**	1 005	**2014**	502			0	0	0	0	0	0	0	0	0
2012	3 828	5 795	1 000	**2015**	1 013	**2015**	506			0	0	0	0	0	0	0	0	0
2013			1 000	**2016**	1 059	**2016**	530			0	0	530	7 942 500	0	0	7 942 500	794 250	184
2014			1 009	**2017**	1 100	**2017**	550	0	0	0	0	550	8 250 000	0	0	8 250 000	825 000	192
2015			1 016	**2018**	1 100	**2018**	550	0	0	0	0	550	8 250 000	0	0	8 250 000	825 000	192
2016			1 102	**2019**	1 100	**2019**	550	0	0	0	0	550	8 250 000	0	0	8 250 000	825 000	192
				2020	1 100	2020	550	0	0	0	0	550	8 250 000	0	0	8 250 000	825 000	192

ENERGY SAVINGS PER YEAR (TOE)														
Household diesel boilers		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**2011**	0	0	0	0	0	0	0	0	0	0	0	0	0
3	**2012**	0	0	0	0	0	0	0	0	0	0	0	0	0
4	**2013**	0	0	0	0	0	0	0	0	0	0	0	0	0
5	**2014**	0	0	0	0	0	0	0	0	0	0	0	0	0
6	**2015**	0	0	0	0	0	0	0	0	0	0	0	0	0
7	**2016**	0	0	0	0	0	0	184	184	184	184	184	184	184
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	184	184	184	184	184	184	184

Household gas boilers

Replacement																
Household gas boilers				Estimated sales		Estimated replacements		A++	kWh/ year	A+	kWh/ year	A	kWh/ year	B	kWh/ year	Total consumption	Savings (kWh)	Savings (TOE)
Lifecycle 20 years				**2010**	100	**2010**	50					0	0	0	0	0	0	0
Imports				**2011**	100	**2011**	50					0	0	0	0	0	0	0
	From EU	Outside EU	**Total**	**2012**	200	**2012**	100					0	0	0	0	0	0	0
2010	10 961	7 827	100	**2013**	325	**2013**	163					0	0	0	0	0	0	0
2011	8 875	4 765	100	**2014**	375	**2014**	188			0	0	0	0	0	0	0	0	0
2012	3 828	5 795	300	**2015**	450	**2015**	225			0	0	0	0	0	0	0	0	0
2013			350	**2016**	525	**2016**	263			0	0	263	3 150 000	0	0	3 150 000	315 000	73
2014			400	**2017**	1 100	**2017**	550	0	0	0	0	550	5 500 000	0	0	5 500 000	550 000	128
2015			500	**2018**	1 100	**2018**	550	0	0	0	0	550	5 500 000	0	0	5 500 000	550 000	128
2016			550	**2019**	1 100	**2019**	550	0	0	0	0	550	5 500 000	0	0	5 500 000	550 000	128
				2020	1 100	2020	550	0	0	0	0	550	5 500 000	0	0	5 500 000	550 000	128

ENERGY SAVINGS PER YEAR (TOE)														
		2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	**2010**	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**2011**	0	0	0	0	0	0	0	0	0	0	0	0	0
3	**2012**	0	0	0	0	0	0	0	0	0	0	0	0	0
4	**2013**	0	0	0	0	0	0	0	0	0	0	0	0	0
5	**2014**	0	0	0	0	0	0	0	0	0	0	0	0	0
6	**2015**	0	0	0	0	0	0	0	0	0	0	0	0	0
7	**2016**	0	0	0	0	0	0	73	73	73	73	73	73	73
8	**2017**	0	0	0	0	0	0	0	0	0	0	0	0	0
9	**2018**	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**2019**	0	0	0	0	0	0	0	0	0	0	0	0	0
11	**2020**	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	73	73	73	73	73	73	73

15. Transport (transport action plan)

Title of the energy efficiency improvement measure (EEI).		Action plan to strengthen public transport
Description	**Timeframe**	Start: 2010, Expiry:
	Purpose / short description	Cyprus does not have a developed public transport system, and there is serious traffic congestion in the major cities. The purpose of the plan is to promote and develop measures/projects/proposals to contribute towards alleviating traffic congestion in large cities. New buses were purchased in large cities in June 2010, as a first step towards implementing the plan. Furthermore, scheduled bus services were established in 2009 between large urban centres and the Larnaca Airport. The measures taken are still at an early stage, and more important developments are expected in the sector, as transport is responsible for almost 50 % of final energy consumption in Cyprus. Based on data from the Ministry of Transport and Works, a target has been set for increasing the percentage of public transport from 2 % in 2009 to 10 % in 2015.
	End use category	Transport sector
	Target group	Public transport
	Area of application	All of Cyprus
Information concerning implementation	**List and description of actions for measure verification.**	Purchase of new buses Setup of bus lanes Establishment of a school bus system

	Budget and source	Not applicable
	Implementing organisation	Department of Road Transport
	Competent monitoring authority	Department of Road Transport
Energy savings	**Method used for monitoring/calculating energy savings.**	The methodology described in Annex E paragraph 18 was used.
	Final energy savings achieved in 2016.	45 266.1 TOE
	Primary energy savings achieved in 2016.	63 759.2 TOE
	Expected primary energy savings in 2020	- TOE
	Contribution towards the target referred to in Article 7 of Directive 2012/27/EU	NO
	Contribution towards the target referred to in Article 5 of Directive 2012/27/EU	NO
	Assumptions	They are described in the methodology set out in Annex E paragraph 18.
	Overlaps	They were taken into account.

ANNEX E: METHODOLOGIES USED TO CALCULATE ENERGY SAVINGS

1. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE MINIMUM ENERGY PERFORMANCE REQUIREMENTS FOR NEW DWELLINGS. ANNEX D-1.1

The Regulation of the Energy Performance of Buildings Laws of 2006 and 2009 enable the Minister for Commerce, Industry and Tourism to lay down by decree the minimum energy performance requirements for new buildings and buildings with a floor area of more than one thousand square metres undergoing major renovation. The first decree was adopted on 21 December 2007 and the minimum requirements pertained only to maximum U-values. The second decree, which entered into force on 1 January 2010, laid down the same U-values, but also included the following minimum requirements: achieving an average U-value and obtaining an energy performance certificate pertaining at least to energy class B. The assumptions used for calculations are as follows:

- The floor area of dwellings constructed in 2009, 2010, 2011, 2012, 2013 and 2014 was obtained from the Statistical Service of Cyprus.
- An assumption was made with regard to the floor area of dwellings constructed in 2008, as there were no available data. It was assumed that the floor area constructed stood approximately at 80 % of that constructed in 2009.
- An assumption was made with regard to the floor area of dwellings constructed in 2015 and 2016, as there were no available data. It was assumed that the floor area constructed was approximately 10 % higher than that constructed in 2014.
- Given that the legislation concerned entered into force on 21 December 2007, it was assumed in respect of 2008 that only half the floor area of dwellings constructed in that year complied said legislation.
- Based on the document 'Calculation for Setting the Minimum Energy Performance Requirements at Cost Optimal Levels According to Article 5 of the Directive 2010/31/EE for the Energy Performance of Buildings (recast)' concerning Cyprus, as notified to the Commission and is posted on the MECIT website (www.mcit.gov.cy), the average consumption per square metre of floor area of single-family houses and apartments was estimated as follows:

Single-family houses - assumptions used to estimate average primary and final consumption									
	m²	**Total Primary Consumption before Buildings Code (kWh/year)**	**Primary Consumption before Buildings Code in (kWh/m²/year)**	**Total Primary Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Primary Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/year)**	**Total Final Consumption before Buildings Code (kWh/year)**	**Final Consumption before Buildings Code in (kWh/m²/year)**	**Total Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/year)**
Single-family	176	39 882	226.6	21 432	121.77	21 718	123.4	66.73	11 744.48

Single-family houses - assumptions used to estimate average primary and final consumption

	Primary Consumption before Building Codes in (kWh/m^2/year)	Primary Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)	Primary Energy Saving (kWh/m^2/year)	Final Consumption before Building Codes in (kWh/m^2/year)	Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)	Average Final Energy Saving (kWh/m^2/year)
Single-family house	226.6	121.8	104.83	123.4	66.7	56.7

New apartments - assumptions used to estimate average primary and final consumption

		m^2	Total Primary Consumption before Buildings Code (kWh/year)	Primary Consumption before Buildings Code in (kWh/m^2/year)	Total Primary Consumption with Buildings Codes (Energy Efficiency Category B)(kWh/year)	Primary Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m^2/year)	Total Final Consumption before Buildings Code (kWh/year)	Final Consumption before Buildings Code in (kWh/m^2/year)	Total Final Consumption with Buildings Codes (Energy Efficiency Category B)(kWh/year)	Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m^2/year)
One-bedroom apartment (46 m^2)	**1St Floor (External Floor)**	46	12 111	263.3	7 741.8	168.3	4 485.4	98	2 867.3	62 333
	Middle Floor	46	10 488.69	228.0	7 483.5	162.7	3 884.7	84.5	2 771.7	60 254
	Last floor	46	14 099	306.50	6 666.3	144.9	5 221.9	113.5	2 469.0	53.7
Two-bedroom apartment (88 m^2)	**1St Floor (External Floor)**	88	19 738	224.3	14 227.9	161.7	13 150	149.4	8 618.5	97.938
	Middle Floor	88	21 554	245	12 853.4472	146.0619	14 801	168	4 760.5	54.1
	Last floor	88	28 192	320.4	12 271.468	139.4485	16 601	188.6	7 182.12	81.615
Three-bedroom apartment (103 m^2)	**1St Floor (External Floor)**	103	28 573	277.41	16 263	157.9	18 093	176	10 164.04	98.68
	Middle Floor	103	26 289	255	14 611	141.9	18 873	183	5 411.414	52.538
	Last floor	103	32 784	318.3	14 687	142.6	20 044	194.6	9 392.982	91.194
TOTAL		**711**	193 828		106 805.1		115 153.457		54 290.0	

New Apartments - assumptions used to estimate average primary and final consumption						
	Average Primary Consumption before Building Codes in (kWh/m²/year)	**Average Primary Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Average Primary Energy Saving (kWh/m²/year)**	**AverageFinal Consumption before Building Codes in (kWh/m²/year)**	**Average Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Average Final Energy Saving (kWh/m²/year)**
One-bedroom apartment (46 m²)	272.6	150.2	122.4	162.0	76.4	85.6
Two-bedroom apartment (88 m²)						
Three-bedroom apartment (103 m²)						

The above savings per square metre per single-family home were used, and the calculations shown in the relevant tables of Annex D paragraph 1.1 were made.

2. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE MINIMUM ENERGY PERFORMANCE REQUIREMENTS FOR NEW TERTIARY SECTOR BUILDINGS. ANNEX D-1.2

- The floor area of tertiary sector buildings constructed in 2009, 2010, 2011, 2012, 2013 and 2014 was obtained from the Statistical Service of Cyprus.
- An assumption was made with regard to the floor area of buildings constructed in 2008, as there were no available data. It was assumed that the floor area constructed stood approximately at 80 % of that constructed in 2009.
- An assumption was made with regard to the floor area of buildings constructed in 2015 and 2016, as there were no available data. It was assumed that the floor area constructed was approximately 10 % higher than that constructed in 2014.
- Given that the legislation concerned entered into force on 21 December 2007, it was assumed in respect of 2008 that only half the floor area of buildings constructed in that year complied with said legislation.
- Based on the document ‘Calculation for Setting the Minimum Energy Performance Requirements at Cost Optimal Levels According to Article 5 of Directive 2010/31/EU on the Energy Performance of Buildings (recast)’ concerning Cyprus, as notified to the Commission and is posted on the MECIT website (www.mcit.gov.cy), the average consumption per square metre of floor area of tertiary sector buildings (calculations were made for office buildings) and apartments was estimated as follows:

Tertiary sector buildings. Offices - assumptions used to estimate average primary and final consumption										
	m²	**Total Primary Consumption before Buildings Code (kWh/year)**	**Primary Consumption before Buildings Code in (kWh/m²/ year)**	**Total Primary Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Primary Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/year)**	**Total Final Consumption before Buildings Code (kWh/year)**	**Final Consumption before Buildings Code in (kWh/m²/year)**	**Total Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Consumption with Buildings Codes (Energy Efficiency Category B (kWh/m²/ year)**
Office building	2 515	645 994	256.9	453 334	180.25	239 257	95.1	167 901.4	66.76

	Primary Consumption before Building Codes in (kWh/m²/year)	**Primary Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Primary Energy Saving (kWh/m²/year)**	**Final Consumption before Building Codes in (kWh/m²/year)**	**Final Consumption with Buildings Codes (Energy Efficiency Category B) (kWh/year)**	**Average Final Energy Saving (kWh/m²/year)**
Office building	256.9	180.3	76.60	95.1	66.8	28.372

The above savings per square metre were used, and the calculations shown in the relevant tables of Annex D paragraph 1.2 were made.

3. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES USE IN THE RESIDENTIAL SECTOR. ANNEX D-2.1

3.1 AUTONOMOUS PHOTOVOLTAIC SYSTEMS

In accordance with data concerning the solar potential in Cyprus, as provided by the Cyprus Department of Meteorology, and on the basis of relevant studies and measurements concerning photovoltaic systems already installed in Cyprus, a polycrystalline or monocrystalline photovoltaic system with a rated capacity of one Kilowatt (1kWp), with a panel angle of 27-30$_0$ and a southern direction, with fixed panels, generates an average of approximately 1 600kWh per year during its first 20 years of operation.

When it comes to autonomous PV systems, for which the energy generated is not measured, a practical (approximate) calculation of the annual energy generated by such an autonomous PV system can be made by multiplying the maximum capacity of each system by 1 600kWh.

The following formula is used to calculate the energy generated:

Sunlight x capacity x coefficient of performance

The coefficient of performance may be different in each case as it depends on ambient temperature, panel angle and orientation, dust in the atmosphere, panel age, etc. Consequently, a study is carried out to calculate the energy generated.

In the case of the grant scheme for autonomous photovoltaic systems, where there were available studies prepared by registered engineers, the relevant data were used. Where there were no available studies, the default value of 1 600kWh per kilowatt was used.

3.2 DOMESTIC SOLAR HOT WATER SYSTEMS

Grants given in the 2004-2010 period

The methodology proposed on page 73 (2.7 Solar water heating in residential and tertiary buildings) of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- Since this category pertained to 37 396 systems for which grants were given in the 2004-2008 period and the data required for the formula were not in electronic format, a random sample of 2 500 requests was taken to cover all the years concerned.
- The sample was used to determine the annual energy generated by each system. Then the average square metres of the panels per installed system and the average energy generated per system and per year were determined. The average values were used in calculating all requests.
- The following formula was used to determine the annual energy generated by each system in the sample:

  TSC*AEG/3600, where:

  TSC: the total area of the solar panels installed for a system (m²)

  AEG: annual energy generated (GJ/m²), based on the official statistics provided by Eurostat on solar hot water production systems. Following are the relevant data for Cyprus:

YEAR	AEG (GJ/ m²)
2005	2 368
2006	2 368
2007	2 800
2008	2 800

  3600: the result is divided by 3600 in order to convert energy values from GJ into MWh.

- The value used for the coefficient ηstock_average_heating_system in the proposed methodology was 1, as there were no available data.
- Seventy per cent (70 %) of the systems replaced are deemed (based on the percentage stated in the 1st NEEAP) to be boilers using conventional fuel and thirty per cent (30 %) of them were deemed to be electric systems.

Grants given in the 2011-2016 period

The methodology proposed on page 73 (2.7 Solar water heating in residential and tertiary buildings) of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- The coefficient used for electricity was 2.7.

- Given the lack of available data, 1 was the value used for the $\eta_{stock\_average\_heating\_system}$ coefficient in the proposed methodology.
- The following formula was used to determine the annual energy generated by each system in the sample:

  TSC*AEG/3600, where:

  TSC: the total area of the solar panels installed for a system (m²)

  AEG: annual energy generated (GJ/m²), based on the official statistics provided by Eurostat on solar hot water production systems for the years 2009-2012.
- Seventy per cent (70 %) of the systems replaced are deemed (based on the percentage stated in the 1st NEEAP) to be boilers using conventional fuel and thirty per cent (30 %) of them were deemed to be electric systems.

3.3 SPACE HEATING/COOLING SYSTEMS USING SOLAR ENERGY.

The methodology used for 'household solar systems' could not be used for this category, as the following parameters should be taken into account in making calculations:

- These systems usually operate for 5-6 months per year
- These systems can be used for heating or cooling or both
- These systems can be used for producing hot water
- These systems can be used for heating water in swimming pools

Consequently, under the circumstances, the only available way to calculate the energy savings achieved by each system was to obtain them from the study submitted with the subsidy request. These studies are prepared by mechanical engineers registered in the Technical Chamber of Cyprus. The TISOL or POLYSUN software is used to calculate energy savings. Following are the parameters used by the above software in making calculations:

T*SOL

- Climatic data from the area
- Average daily consumption of hot water
- Temperature of hot water and water intended for space heating, in the tank
- Heating load
- Desirable temperature in the building
- Type of liquid in panels
- Type of solar heating system
- Number of panels
- Panel manufacturer
- Panel type
- Panel surface area
- Panel shading
- Tank type
- Tank volume

- Tank thermal insulation
- Type and mode of connection of heat exchanger
- Type of conventional energy source
- Conventional system performance

B. RETSCREEN

- Climatic data from the area
- Type of solar heating system
- Daily consumption in l
- Water temperature in tank
- Operating hours of system
- Percentage of use / month
- Panel angle
- Deviation from south
- Panel type
- Panel surface area
- Panel performance and losses
- Other losses
- Tank volume
- Exchanger performance
- Pump capacity
- Electricity value
- Type of conventional source
- Conventional system performance

POLYSUN

- Climatic data from the area
- Type of solar heating system
- Daily consumption in l
- Water temperature in tank
- Panel angle
- Deviation from south
- Panel type
- Panel surface area
- Panel performance and losses
- Tank volume
- Type of conventional source
- Conventional system performance
- Capacity of conventional energy source

3.4 CENTRAL ACTIVE SOLAR WATER HEATING SYSTEMS USING SOLAR ENERGY.

The methodology used for ‘household solar systems’ could not be used for this category, as the following parameters should be taken into account in making calculations:

- These systems are installed mainly in hotel establishments operating either on a 12-month or on a seasonal basis. Consequently, the energy generated by these systems may not be considered as savings.

Consequently, under the circumstances, the only available way to calculate the energy savings achieved by each system was to obtain them from the study submitted with the subsidy request.

These studies are prepared by mechanical engineers registered in the Technical Chamber of Cyprus. The T*SOL or POLYSUN or RETSCREEN software is used to calculate energy savings, using the parameters described above.

3.5 SOLAR SWIMMING POOL WATER HEATING SYSTEMS

The methodology used for 'household solar systems' (3.2) could not be used for this category, as the following parameters should be taken into account in making calculations:

- These systems usually operate for 4-6 months per year, depending on the region in which they are installed. Consequently, the energy generated by these systems may not be considered as savings.

Consequently, under the circumstances, the only available way to calculate the energy savings achieved by each system was to obtain them from the study submitted with the subsidy request. These studies are prepared by mechanical engineers registered in the Technical Chamber of Cyprus. The TISOL or POLYSUN or RETSCREEN software is used to calculate energy savings, using the parameters described above.

3.6 HEAT PUMP WITH GROUND HEAT EXCHANGER FOR SPACE HEATING AND COOLING.

The methodology used in calculating savings from the investments included in the following category was based on the following assumptions:

1. Typical conventional boiler performance: 85 %
2. Typical conventional air conditioner performance (EER): 300 %
3. Typical electricity generation performance for power plants: 34 %
4. Fuel calorific value (Cp - calorific value) (kWh/l): 11.04

Following is the calculation procedure:

1. Calculation procedure for the Cooling cycle:
   - Where there are no quantifiable data, the energy consumed for cooling the building, in kWh of electricity, is used, as calculated by an engineer registered with the Technical Chamber of Cyprus who has prepared the study.
   - The electricity consumed by the heat pump is calculated for meeting the same thermal energy demand of the building for cooling when using a conventional system. In making this calculation, the heat pump performance in a cooling cycle — as calculated by the designer — is used, taking into account temperature, subsoil and other data for Cyprus.
   - The difference between these two values is translated into kWhth of primary energy by using the typical electricity generation performance of power plants.
2. Calculation procedure for the Heating cycle:
   - Where there are no quantifiable data, the energy consumed for heating the building, in kWhth of diesel, is used, as calculated by the engineer who has prepared the study.

- The electricity consumed by the heat pump is calculated for meeting the same thermal energy demand of the building for Heating when using a conventional system. In making this calculation, the heat pump performance in a heating cycle — as calculated by the designer — is used, taking into account temperature, subsoil and other data for Cyprus.
- The above energy is translated into kWhth of primary energy by using the typical electricity generation performance of power plants.
- The two consumptions are deducted and the savings achieved in the heating cycle are calculated in kWhth of primary energy.

By adding the two savings we obtain the annual energy savings for heating and cooling from the heat pump compared to conventional systems.

4. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES USE IN THE TERTIARY SECTOR. ANNEX D - MEASURE 2.2

4.1 AUTONOMOUS PHOTOVOLTAIC SYSTEMS

The methodology used was the same as in paragraph 3.1 above.

4.2 SPACE HEATING/COOLING SYSTEMS USING SOLAR ENERGY.

The methodology used was the same as in paragraph 3.3 above.

4.3 CENTRAL ACTIVE SOLAR WATER HEATING SYSTEMS USING SOLAR ENERGY.

The methodology used was the same as in paragraph 3.4 above.

4.4 SOLAR SWIMMING POOL WATER HEATING SYSTEMS.

The methodology used was the same as in paragraph 3.5 above.

4.5 HEAT PUMP WITH GROUND HEAT EXCHANGER FOR SPACE HEATING AND COOLING.

The methodology used was the same as in paragraph 3.6 above.

5. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GRANT SCHEME FOR ENCOURAGING THE USE OF RES USE IN THE INDUSTRY SECTOR. ANNEX D-2.3

5.1 AUTONOMOUS PHOTOVOLTAIC SYSTEMS

The methodology used was the same as in paragraph 3.1 above.

5.2 SPACE HEATING/COOLING SYSTEMS USING SOLAR ENERGY.

The methodology used was the same as in paragraph 3.3 above.

5.3 CENTRAL ACTIVE SOLAR WATER HEATING SYSTEMS USING SOLAR ENERGY.

The methodology used was the same as in paragraph 3.4 above.

6. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE ENERGY SAVINGS GRANT SCHEME IN THE RESIDENTIAL SECTOR - THERMAL INSULATION OF WINDOWS, WALLS, ROOFS. ANNEX D-3.1

Grants given in the 2004-2010 period

The methodology proposed on page 65 [2.2 Insulation refurbishment measures applied to building components (walls, roofs, windows) in existing residential and tertiary buildings] of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- Out of all requests made, 81% pertained to windows, 8% to walls and 11% to roofs.
- The requests were broken down into lowland area requests (elevation of less than 600 m) and mountainous area requests for each province (Nicosia, Larnaca, Paphos, Limassol, Famagusta).
- They were also broken down into existing and newly constructed houses (those built during the operation of the grant scheme, having obtained a building permit prior to the entry into force of the law on the mandatory thermal insulation of houses).
- As 27 000 investments were implemented and subsidised in the 2004-2009 period, falling within the above three subcategories, and the data required for the formula were not available in electronic format, a sample of 1 340 applications was taken.
- The sample applications taken were used as a basis to calculate the average value for each type of investment (lowland areas, mountainous areas), the U-value after the investment and the floor area of the investment.
- As no U-value was required by the scheme before the investment during the application submission period, it was assumed, in accordance with the practice followed for the construction of houses before entry into force of the laws on the mandatory thermal insulation of houses, that windows had single glazing, walls were built with one layer of bricks and ordinary plaster, and roofs had no thermal insulation at all. By using these assumptions, the U-values were calculated for the above 3 categories.
- As far as the degree days required by the energy savings calculation formula are concerned, in accordance with the data provided by the Department of Meteorology for 35 stations in lowland areas and 14 stations in mountainous areas, an individual average value was calculated for each province both for lowland and mountainous areas.
- Based on the data provided by the Energy Service and the Cyprus Institute of Energy, approximately 85 % of the houses use conventional fuel boilers for heating and 15 % of them use an electrical resistor.
- The default values referred to on page 65 were used for the coefficients a, b, and c required in the proposed methodology.
- The coefficient used for electricity was 2.7.

Grants given in the 2011-2013 period

The following assumptions were used for the years 2011-2013:

- The methodology proposed on page 65 [2.2 Insulation refurbishment measures applied to building components (walls, roofs, windows) in existing residential and tertiary buildings] was used for each investment separately.
- The heating degree days of the climate zone in which the house where the investment was made is located were used for each individual investment.
- As no U-value was required by the scheme before the investment during the application submission period, it was assumed, in accordance with the practice followed for the construction of houses before entry into force of the laws on the mandatory thermal insulation of houses, that windows had single glazing, walls were built with one layer of bricks and ordinary plaster, and roofs had no thermal insulation at all. By using these assumptions, the U-values were calculated for the above 3 categories.
- The U-value after the investment arises from the data accompanying each application.
- The default values referred to on page 65 were used for the coefficients a, b, and c required in the proposed methodology.
- Based on the data provided by the Energy Service and the Cyprus Institute of Energy, approximately 85 % of the houses use conventional fuel boilers for heating and 15 % of them use an electrical resistor.
- The coefficient used for electricity was 2.7.

7. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE ENERGY SAVINGS GRANT SCHEME IN THE PUBLIC AND BROADER PUBLIC SECTOR. ANNEX D-3.2

The methodology used was the same as in paragraph 8 below.

8. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE ENERGY SAVINGS GRANT SCHEME IN THE TERTIARY SECTOR. ANNEX D-3.3

Provision of the grant scheme: for a beneficiary under this category to be subsidised, a technical and financial study must be submitted to demonstrate that energy savings of at least 10 % are ensured by the system installed. The energy savings resulting from each study separately, as confirmed by the Cyprus Institute of Energy, was calculated on the basis of one of the following methodologies depending on the type of investment.

THERMAL INSULAITON / REPLACEMENT OF GLAZING

Software (e.g., Hevacomp, Carrier) is used for this category of investment, into which the different data are entered (e.g., orientation and location of the building, area of the different surfaces, use of the building, U-value of the building elements, etc.) in order to calculate the heating and cooling needs in kW. The required energy in kWh is calculated in accordance with the hours of operation and the use of the building.

When certain building elements are replaced and/or new ones are added to the building envelope, or when glazing is replaced, the same software is used to calculate the new heating and cooling needs in kWh.

The difference arising between the two calculations represents the energy savings achieved.

LAMPS

As far as lamps are concerned, the total electric power and operating hours thereof are known. Being aware of the total electric power of new lamps, the arising difference in energy consumption (in kWh) represents the energy savings achieved.

EMS-BMS / ELEC SAVER / POWER PLANNER / ELECTROFLOW / POWER FACTOR/ AIR COMPRESSORS / LIFTS / INVERTERS / AIR CONDITIONERS / KEY FOB

When it comes to energy-saving technologies, energy savings calculations are based on real-time measurements taken before and after installing the relevant system, on the basis of electricity bills issued over a period beginning two (2) years before installation and ending one (1) year after installation.

HEAT RECOVERY

Energy savings calculations are based on real-time measurements taken before and after installing the relevant system, on the basis of electricity bills issued over a period beginning two (2) years before installation and ending one (1) year after installation where hot water was produced by an electrical system, or on the basis of diesel invoices issued over a period beginning two (2) years before installation and ending one (1) year after installation where hot water was produced by a diesel system.

9. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE ENERGY SAVINGS GRANT SCHEME IN THE INDUSTRY SECTOR. ANNEX D-3.4

The methodology used was the same as in paragraph 8 above.

10. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GRANT SCHEME FOR THE INSTALLATION OF PHOTOVOLTAIC SYSTEMS USING THE NET METERING METHOD ANNEX D-4

The methodology used was the same as in paragraph 3.1 above.

11. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE INSTALLATION OF PHOTOVOLTAIC SYSTEMS FOR AUTOPRODUCTION ANNEX D-5

The methodology used was the same as in paragraph 3.1 above.

12. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GREEN PUBLIC PROCUREMENT SCHEME. ANNEX D-6

12.1 REPLACEMENT OF LAMPS WITH COMPACT5 FLUORESCENT LAMPS

The methodology proposed on page 77 (2.9 Replacement or new installation of Lamps in residential buildings) of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- As there were no available data on the average power of the lamps being replaced, a default value of 118 kWh/year was used as the energy savings per lamp, as shown in table 1.2 of page 84 of the proposed methodologies section.
- The default value of 2 500 hours/year was used as the average operating hours, as shown in table 1.2 of page 84 of the proposed methodologies section.
- The average lifecycle of the lamps distributed in the 2007-2011 period is 6 000 hours.
- A coefficient of 2.7 was used for electricity calculations.

12.2 REPLACEMENT OF AIR CONDITIONERS

The methodology proposed on page 71 [2.6 Installation or replacement of air conditioning split system (<12kW) in residential and tertiary buildings] of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- The default value of 2.50 was used for the $EER_{average}$ parameter, as used in the software (ISBEM) employed for issuing energy efficiency certificates for buildings in Cyprus.
- The data for the $EER_{best\_perf\_on\_market}$ parameter per type of air conditioner and per year were provided by the Cyprus Department of Electrical Services, which is responsible for the replacement of air conditioners and the implementation of the measure in question.
- The power for each type of air conditioner (P_{fn}) per year was provided by the Department of Electrical and Mechanical Services.
- Annual operating hours (parameter n_{sh}) were set at 1 400. This value was provided by the Department of Electrical Services.
- A default value of 58 %, as referred to in the methodology, was used for the f_u coefficient.
- The expected lifecycle of air conditioners was set at 10 years, on the basis of the default value referred to in the table of page 86.

12.3 INSTALLATION OF NEW AIR CONDITIONERS

The methodology proposed on page 71 [2.6 Installation or replacement of air conditioning split system (<12kW) in residential and tertiary buildings] of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- Concerning the $EER_{average}$ parameter, it was assumed that, if the measure was not implemented, the parameter would be 2.70 for the installation of air conditioners.
- The data for the $EER_{best\_perf\_on\_market}$ parameter per type of air conditioner and per year were provided by the Cyprus Department of Electrical and Mechanical Services, which is responsible for the replacement of air conditioners and the implementation of the measure in question.
- The power for each type of air conditioner (P_{fn}) per year was provided by the Department of Electrical and Mechanical Services.
- Annual operating hours (parameter n_{sh}) were set at 1 400. This value was provided by the Department of Electrical and Mechanical Services.
- A default value of 58 %, as referred to in the methodology, was used for the f_u coefficient.
- The expected lifecycle of air conditioners was set at 10 years, on the basis of the default value referred to in the table of page 86.

12.4 REPLACEMENT OF VRVs AND HEAT PUMPs

As there was no other available methodology, the one proposed on page 71 [2.6 Installation or replacement of air conditioning split system (<12kW) in residential and tertiary buildings] of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- It was assumed that the $EER_{average}$ parameter is equal to 2.00.
- The data for the $EER_{best\_perf\_on\_market}$ parameter per type of system were provided by the Cyprus Department of Electrical and Mechanical Services, which is responsible for the replacement of air conditioners and the implementation of the measure in question.
- The power for each type of system (P_{fn}) per year was provided by the Department of Electrical and Mechanical Services.
- Annual operating hours (parameter n_{sh}) were set at 1 400. This value was provided by the Department of Electrical and Mechanical Services.
- A default value of 58 %, as referred to in the methodology, was used for the f_u coefficient.
- The expected lifecycle of air conditioners was set at 10 years, on the basis of the default value referred to in the table of page 86.

12.5 PURCHASING NEW COMPUTERS

Energy savings were calculated on the basis of the default values set out in table 1.2 of page 84 and in the table of page 86 of the methodologies proposed in Directive 2006/32/EC on energy end use and energy services. More specifically:

- The default value of 39 kWh/year was used for the energy savings per computer.
- The default value of 3 years was used as the average life cycle.
- A coefficient of 2.7 was used for electricity calculations.

12.6 PURCHASING NEW MONITORS

Energy savings were calculated on the basis of the default values set out in table 1.2 of page 84 and in the table of page 86 of the methodologies proposed in the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end-use and energy services'. More specifically:

- The default value of 11 kWh/year was used for the energy savings per computer.
- The default value of 3 years was used as the average life cycle.
- A coefficient of 2.7 was used for electricity calculations.

12.7 REPLACEMENT OF BOILERS

The methodology proposed on page 68 (2.4 Replacement of heating supply equipment in residential and tertiary buildings) of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings: The values for each parameter of the methodology used are set out in the relevant table of Annex D paragraph 6.

13. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE VEHICLE SCRAPPING SCHEME. ANNEX D-7

Low fuel consumption policy as in effect in the period 2008-2010

Following are some of the provisions of the scrapping scheme:

- ✓ Category C(i): Grant (EUR 1 283) for the scrapping of a vehicle aged over 10 years with a valid registration in the last 12 months before the date of entry into force of the scheme and purchase of a new vehicle with a fuel consumption of 5-7 l/100km or a motorcycle.
- ✓ Category C(ii): Grant (EUR 1 710) for the scrapping of a vehicle aged over 10 years with a valid registration in the last 12 months before the date of entry into force of the scheme and purchase of a new vehicle with a fuel consumption of at least 5 l/100km.

It was assumed that the new vehicles purchased under scrapping scheme C(i) had an average fuel consumption of 6 l/100km, and those purchased under scrapping scheme C(ii) had an average fuel consumption of 4.3 l/100km. As regards scrapped vehicles which were replaced with new ones purchased under categories C(i) and C(ii), it was assumed that they were gasoline-fuelled vehicles with an average fuel consumption of 10 l/100km.

Savings per vehicle under category C(i) were estimated to amount to 0.628 TOE/year, whereas savings under category C(ii) were estimated to amount to 0.896 TOE/year.

14. METHODOLOGY USED TO CALCULATE SAVINGS FOR THE GRANT SCHEME FOR VEHICLES. ANNEX D-8

The number of electric, hybrid and low CO_2 emission vehicles purchased in aggregate through participation in the grant scheme was taken into account in calculating energy savings.

In calculating energy savings from vehicles purchased under the grant scheme, it was assumed that such vehicles would replace the purchase of an average gasoline-fuelled urban vehicle. In particular, the following assumptions were used in making the calculations:

1. Each private vehicle covers a maximum distance of 20 000 km (~ 55 km/day) per year
2. It was calculated that 2.39×10^{-4} toe of fuel oil are required to generate one kilowatt hour of electricity

Calculation of the primary HFO energy required to generate one kWh of electricity

1kWh =0.086*10-3toe

$$0.086*10 \text{ toe} * \frac{1}{0.36} = 2.39*10^{-4}\, toe \text{ HFO}$$

where 0.36: the efficiency rate of an HFO-fired power plant

3. The density of 95 gasoline is 750 Kg/m3.
4. A coefficient of 0.86×10^{-4} was used to convert one kWh of electricity into toe and a coefficient of 1 051 was used to convert one metric tonne of 95 gasoline into toe
5. As regards hybrid vehicles, it was assumed that the average fuel consumption of the hybrid vehicles purchased was 4.3 l/100km
6. As regards electric vehicles, it was assumed that the average fuel consumption of the electric vehicles purchased was 0.1 kWh/km
7. As regards low CO2 emission vehicles (vehicles with carbon dioxide emissions below 120 g/Km), it was assumed that the average fuel consumption of the vehicles purchased was 5 l/100km
8. Compared to the vehicles whose purchase was avoided due to the grant scheme, it was assumed that the average fuel consumption of such a vehicle was 7 l/100km.
9. Vehicles are assumed to have a 15-year lifecycle.
10. Savings per vehicle were calculated on the basis of the above assumptions:

	Consumption per vehicle/year (hybrid, electric, low-pollutant) TOE	Consumption of conventional vehicle TOE	Savings per vehicle/year
Hybrid vehicles	0.675	1.1	0.425
Electric vehicles	0.478	1.1	0.622
Low CO2 emission vehicles	0.786	1.1	0.314

15. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE COMPACT FLUORESCENT LAMPS CAMPAIGN. ANNEX D-9

The methodology proposed on page 77 (2.9 Replacement or new installation of Lamps in residential buildings) of the document 'Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end use and energy services' was used to calculate energy savings, on the basis of the following assumptions:

- As there were no available data on the average power of the lamps being replaced, a default value of 47 kWh/year was taken as the energy savings per lamp, as shown in table 1.2 of page 84 of the proposed methodologies section.
- The default value of 1 000 hours/year was used as the average operating hours, as shown in table 1.2 of page 84 of the proposed methodologies section.
- The average lifecycle of the lamps distributed in 2007, 2008 and 2010-2012 is 6 000, 8 000 and 10 000 hours, respectively. Consequently, the lamps distributed in 2007 and 2008 did not contribute towards the attainment of the 2016 target.
- A coefficient of 2.7 was used for electricity calculations.
- The lamps distributed after 2009 do contribute towards the attainment of the 2020 target if their lifecycle permits so.
- It is considered that these lamps are used to immediately replace old lamps.

16. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE 'SAVE & UPGRADE' SCHEME FOR DWELLINGS. ANNEX D-10.1

The following methodology was used in calculating the energy savings from the implementation of energy upgrades for each application filed and implemented under the grant scheme:

1. The energy performance certificates on the situation before and after the energy upgrade were used to calculate the annual primary energy savings of the holding.

2. As there were no available data concerning all the applications evaluated, the annual energy savings for each holding were converted into final energy savings, where necessary (Article 7 EED), using the assumption that 60 % of the energy consumed at the holding related to electricity and other 40 % related to conventional fuels.

3. To convert primary energy into final energy, a coefficient of 2.7 was used for electricity and 1.1 for fuels.

17. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE ‘SAVE & UPGRADE’ SCHEME FOR UNDERTAKINGS. ANNEX D-10.2

1. The energy performance certificates on the situation before and after the energy upgrade or the energy audit carried out on the holding (applicants were allowed to submit either) were used to calculate the annual final energy savings of the holding.

2. The annual energy savings for each holding were converted into final primary energy savings, where necessary (2020 primary consumption target) using a coefficient of 2.7 for electricity and 1.1 for conventional fuels.

18. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE SOLAR WATER HEATERS REPLACEMENT SCHEME. ANNEX D-11

The methodology described in Annex E paragraph 3 (3.2 domestic solar hot water production systems) was used to calculate savings.

19. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE IMPLEMENTATION OF HORIZONTAL MEASURES TOWARDS ATTAINMENT OF THE TARGET REFERRED TO IN ARTICLE 7 EED. ANNEX D-12

The following methodology was used to calculate savings:

Bottom-up formula	
$TFES = FEC_{TG} * S_{Q} \,\&\, FEC = n * FEC_{person} * p_{affected}$	
Definition	
TFES	Total Final Energy Savings [kWh/a]
FEC_{TG}	Final energy consumption of specific target group (for electricity) [kWh/a]
FECperson	Final energy consumption of a person (either for electricity or for electricity and heat) [kWh/a]
S_{Q}	Savings factor of the awareness raising campaign [%]
n	Number of involved persons of a specific target group
$p_{affected}$	Percentage of affected persons of a specific target group
Baseline	

No conduction of awareness raising campaign		
Parameters	**Value**	**Source**
Final Energy Consumption of a person [kWh/a]	**4,679**	National data
Savings factor of an awareness raising campaign [%]	**2%**	IDAE 2009[8]
paffected	**40%**	-

20. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE IMPLEMENTATION OF MEASURES TOWARDS ATTAINMENT OF THE TARGET REFERRED TO IN ARTICLE 5 EED. ANNEX D-13

The methodologies referred to in tables 3, 4 and 5 of the alternative approach to attaining the target referred to in Article 5 of the Directive were used in calculating the energy savings from the implementation of energy upgrades and individual energy savings measures. The alternative approach is posted at:
http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument

21. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE REPLACEMENT OF HOM APPLIANCES (ECODESIGN). ANNEX D-14

Household dishwashers

1. Imported quantities

The number of dishwashers imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. https://tinyurl.com/mvztvby

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

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[8] Source: IDAE, 2009. Changing Energy Behaviour Guidelines for Behavioural Change Programmes.

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 230 kWh/year for category A+++; 260 kWh/year for category A++; 290 kWh/year for category A+; and 330 kWh/year for category A.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 30 % savings). Category A++ products will replace category A products (assumption for 21 % savings). Category A+ products will replace category A products (assumption for 11 % savings), and category A products will replace category B products (assumption for 11 % savings).

4. Product lifecycle

It is estimated that household dishwashers will have a 12-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

A coefficient of **44 kWh/year** was used, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'**.**

Household refrigerators

1. Imported quantities

The number of household refrigerators imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 67 kWh/year for category A+++; 84 kWh/year for category A++; 117 kWh/year for category A+; and 150 kWh/year for category A. The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 56 % savings). Category A++ products will replace category A products (assumption for 44 % savings). Category A+ products will replace category A products (assumption for 22 % savings), and category A products will replace category B products (assumption for 23 % savings).

4. Product lifecycle

It is estimated that household refrigerators will have a 15-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

A coefficient of **67 kWh/year** was used, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Air conditioners

1. Imported quantities / Estimated sales

The number of air conditioners imported to Cyprus were calculated based on data obtained from the Statistical Service; the number and percentage of dwellings with air conditioners are given. We assumed that each house has two air conditioners, which are replaced every 15 years, and calculated the number of air conditioners that are sold every year. **https://tinyurl.com/mvztvby**

2. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values for 12 000 BTU, by multiplying the number of air conditioners) were used: 140 kWh/year for category A+++; 165 kWh/year for category A++; 220 kWh/year for category A+; 310 kWh/year for category A; and 400 kWh/year for category B.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 55 % savings). Category A++ products will replace category A products (assumption for 47 % savings). Category A+ products will replace category A products (assumption for 30 % savings), and category A products will replace category B products (assumption for 30 % savings).

3. Product lifecycle

It is estimated that household air conditioners will have a 15-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

4. Savings from new installations

No coefficient is given for conditioners in the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Household freezers

1. Imported quantities

The number of household freezers imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 110 kWh/year for category A+++; 140 kWh/year for category A++; 200 kWh/year for category A+; and 245 kWh/year for category A.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 56 % savings). Category A++ products will replace category A products (assumption for 44 % savings). Category A+ products will replace category A products (22 % savings).

4. Product lifecycle

It is estimated that household freezers will have a 15-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

A coefficient of **71 kWh/year** was used, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Household refrigerators and freezers

1. Imported quantities

The number of household refrigerators and freezers imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 155 kWh/year for category A+++; 200 kWh/year for category A++; 275 kWh/year for category A+; and 350 kWh/year for category A.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 56 % savings). Category A++ products will replace category A products (assumption for 44 % savings). Category A+ products will replace category A products (22 % savings).

4. Product lifecycle

It is estimated that household refrigerators and freezers will have a 15-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

A coefficient of **69 kWh/year** was used, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Household washing machines

1. Imported quantities

The number of household washing machines imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 160 kWh/year for category A+++; 180 kWh/year for category A++; 200 kWh/year for category A+; and 230 kWh/year for category A.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 32 % savings). Category A++ products will replace category A products (assumption for 23 % savings). Category A+ products will replace category A products (14 % savings).

4. Product lifecycle

It is estimated that household washing machines will have a 12-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

A coefficient of **13 kWh/year** was used, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Household tumble dryer

1. Imported quantities

The number of household tumble dryers imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 150 kWh/year for category A++; 200 kWh/year for category A+; 300 kWh/year for category A; and 350 kWh/year for category B.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 50 % savings). Category A+ products will replace category A products (35 % savings). Category A products ensure 15 % savings when replacing category B products, and category B products ensure 10 % savings when replacing category C products.

4. Product lifecycle

It is estimated that household tumble dryers will have a 12-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

No coefficient is given for tumble dryers in the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Television sets

1. Imported quantities

The number of television sets imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. The data kept by the Statistical Service consisted in the kg of television sets imported. We assumed that a television set package weighs ten kg on average and divided the total kg by that number to find the number of sets. **https://tinyurl.com/mvztvby**

2. Estimated sales

It was assumed that half the products of the previous year (products in stock) are sold in the current year. As regards 2010, in the absence of data concerning 2009, it was assumed that all the products imported were sold. From the year 2018, when Cyprus is expected to exit the recession, sales are expected to increase slightly.

3. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 50 kWh/year for category A++; 70 kWh/year for category A+; 90 kWh/year for category A; and 117 kWh/year for category B.

The energy savings were calculated based on the estimate that category A+++ products will replace category A products (assumption for 47 % savings). Category A+ products will replace category A products (23 % savings). Category A products ensure 30 % savings when replacing category B products, and category B products ensure 30 % savings when replacing category C products.

4. Product lifecycle

It is estimated that television sets will have a 5-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

5. Savings from new installations

No coefficient is given for television sets in the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Electric ovens

1. Imported quantities / Estimated sales

The number of electric ovens imported to Cyprus from 2010 to 2016 was obtained from the Statistical Service. The number and percentage of dwellings with electric ovens are given. An electric oven's operating hours per week are also given, so we calculated the kWh/year. https://tinyurl.com/mvztvby

2. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 190 kWh/year for category A; 240 kWh/year for category B; and 285 kWh/year for category C.

The energy savings were calculated based on the estimate that category A products will replace category C products (assumption for 33 % savings). Category B products ensure 17 % savings when replacing category C products, and category C products ensure 15 % savings when replacing category D products.

3. Product lifecycle

It is estimated that electric ovens will have a 10-year lifecycle.

4. Savings from new installations

No coefficient is given for electric ovens in the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END- USE EFFICIENCY AND ENERGY SERVICES'.

Diesel and natural gas boilers

1. Imported quantities / Estimated sales

The number of boilers imported to Cyprus from 2013 to 2016 was obtained from the Statistical Service. The data kept by the Statistical Service consisted in the kg of boilers imported. We assumed that a boiler package weighs 300 kg on average and divided the total kg by that number to find the number of sets. The number of dwellings and the percentage of dwellings with boilers were obtained from the building permits issued from 2013 to 2016. **https://tinyurl.com/mvztvby**

2. Estimate of systems replacing existing ones

We assumed that half the products we took into account in the sales estimate were intended to replace existing ones.

Diesel boilers:

All sales related to class A boilers with a consumption level of 30 kW. Based on a study prepared by the Statistical Service, boilers function for approximately 5 hours per day for approximately 100 days per year. 30 x 5 x 100 = 15 000 kW/year. There are no data on the energy category of diesel boilers that are available for sale, as these are part of old stocks and no company offered to help us in that respect. We assume that the data are the same as for natural gas boilers.

Natural gas boilers:

All sales related to class A boilers with a consumption level of 20 kW. Based on a study prepared by the Statistical Service, boilers function for approximately 5 hours per day for approximately 100 days per year. 20 x 5 x 100 = 10 000 kW/year

3. Product lifecycle

It is estimated that boilers will have a 20-year lifecycle, based on the document 'RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES'.

Vacuum cleaners

1. Imported quantities / Estimated sales

The number of vacuum cleaners imported to Cyprus from 2013 to 2016 was obtained from the Statistical Service. **https://tinyurl.com/mvztvby**

2. Estimate of systems replacing existing ones

The following assumptions were made:

(a) half the products already sold or to be sold will replace other products;

(b) the sales rate per energy category was estimated on the basis of a market survey; also the sales rate per energy category was estimated for 2017. That sales rate remained fixed from 2017 onwards;

(c) the sales rate per energy category was estimated based on the results of a survey carried out on electric product markets;

(d) The following average annual consumption values were used: 28 kWh/year for category A; 34 kWh/year for category B; 40 kWh/year for category C; 46 kWh/year for category D; 52 kWh/year for category E; and 58 kWh/year for category F.

The energy savings were calculated based on the assumption that all the products intended for replacement will ensure 20 % savings.

3. Product lifecycle

It is estimated that vacuum cleaners will have a 5-year lifecycle.

22. METHODOLOGY USED TO CALCULATE SAVINGS FROM THE GRANT SCHEME FOR VEHICLES. ANNEX D-15

The methodology used is described in paragraph 3.5.2 (Savings from measures in the transport sector) of the NEEAP

ANNEX F: STRATEGY FOR MOBILISING INVESTMENT IN THE FIELD OF BUILDING RENOVATION

ENERGY SERVICE
MINISTRY OF ENERGY, COMMERCE, INDUSTRY AND TOURISM

Strategy for mobilising investment in the field of building renovation

In accordance with Article 4 of Directive 2012/27/EU on energy efficiency

April 2017

13-15 ANDREA ARAOUZOU ST., 1421 NICOSIA, CYPRUS

Contents

1. Introduction

In accordance with Article 4 of Directive 2012/27/EU on energy efficiency, Member States shall establish a long-term strategy for mobilising investment in the renovation of the national building stock (European Parliament and Council, 2012). The strategy shall encompass at least the following:

(i) an overview of the national building stock based, as appropriate, on statistical sampling;

(ii) identification of cost-effective approaches to renovations relevant to the building type and climatic zone;

(iii) policies and measures to stimulate cost-effective deep renovations, including staged renovations;

(iv) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;

(v) an evidence-based estimate of expected energy savings and broader benefits.

Dwellings in Cyprus are estimated to account for 18 % of the final energy consumption, whereas commerce, hotels and services, i.e. mostly offices, account for another 11 % (Energy Service of the Ministry of Energy, Commerce, Industry and Tourism, 2017). The different political, economic and social conditions that prevailed for many years did not favour the implementation of energy savings measures in building construction. The first organised effort to implement energy savings measures in buildings was made in 2004 through the grant schemes of the Special Fund for Renewable Energy Sources (RES) and Energy Savings (ES), whereas the implementation of mandatory measures in new buildings and large buildings undergoing major renovation started in 2007 upon adoption of the Regulation on the Energy Performance of Buildings (Minimum energy performance requirements) Decree of 2007. As a result, we now have a building stock that consumes large amounts of energy, thus having a negative economic and environmental impact. Also, the absence of sufficient thermal insulation measures and the excessive exposure to sunlight in many buildings are detrimental to people’s health, reduce employee productivity and downgrade the overall quality of life. Major renovation of buildings is a chance to tackle many of those problems.

This publication uses quantitative and qualitative indicators to stress the problems caused by the energy status of the building stock to date, as well as the opportunities offered by increased mobilisation in investment in major renovation. It identifies the parties involved, the obstacles they come across and how these can be overcome. Speeding up the rate of implementation of renovation and the increase in the energy savings measures applied in renovation are in line with the energy and environmental targets of Cyprus. **The aim is to ensure the energy upgrading of the building stock in cost-optimal ways for the owner, while at the same time maximising economic, environmental and social benefits for Cyprus.**

The strategy for mobilising investment in the renovation of buildings was drawn up following consultation with the stakeholders. The consultation was carried out through the statutory Advisory Committee for Monitoring the Application of the Regulation on the Energy Performance of Buildings Laws, comprising 22 organisations and bodies, including engineers, architects, building contractors, technical building system installers, land developers, universities, consumer associations and public sector departments involved in the building sector. There were also individual meetings held on the energy upgrading of buildings with employers' associations, financial institutions and private organisations whose primary objective is to carry out research and provide information in the energy sector. The exchange of views between the Ministry of Energy, Commerce, Industry and Tourism and the parties involved in building renovation was in itself an opportunity to exchange knowledge and come up with new ideas.

2. Review of the national building stock and trends concerning its development up until 2030

The building stock of Cyprus is relatively new, as most buildings were constructed in or after the 1980s. As a result of the absence of any policy measures for the construction of these buildings, most of the existing buildings have a low energy efficiency rating. This is reflected in the final energy consumption of buildings, which rose dramatically from the late 1990s onwards, with a slight drop in 2013 due to the economic crisis. It is therefore true that there is great unused potential for energy savings in buildings. The review of the existing building stock is broken down into homes (residential buildings), non-residential buildings and public buildings and is based on statistics available from the Statistical Service and the technical report entitled 'Building Stock in Cyprus and Trends to 2030', as prepared by the Joint Research Institute (JRC) for the Ministry of Energy, Commerce, Industry and Tourism. This chapter also cites estimates of the expected development of the existing building stock up until 2030.

2.1 Dwellings

There are 300 thousand dwellings used as permanent dwellings. Approximately another 78 thousand dwellings are used as country or tourist dwellings, meaning that they are typically used for shorter periods of time, thus consuming less energy. There are also another 54 thousand empty dwellings, meaning that they are available for sale or renting or that some of them are abandoned (Statistical Service of the Ministry of Finance, 2011).

Table 1: Dwellings per type of building and type of occupancy (Statistical Service of the Ministry of Finance, 2011)

TYPE OF BUILDING IN WHICH THE HOME IS LOCATED	TYPE OF OCCUPANCY					
	Total	Occupied as a usual place of residence	Empty home	Used as a country/ second home	Used as tourist apartment/ home	Demolition / other use
Total	**431 059**	**297 122**	**54 651**	**71 942**	**6 146**	**1 198**
Single-family house	172 944	129 268	12 949	28 090	1 959	678
Two-family house	59 050	48 743	4 597	5 344	247	119
Terraced houses	32 893	18 004	4 883	8 922	859	225
Auxiliary house	8 993	6 457	1 809	679	2	46
Multi-apartment building	123 557	72 072	24 254	24 729	2 418	84
Home in a mixed-use building	32 530	22 215	6 066	3 589	618	42
Other type of building	1 092	363	93	589	43	4

Source: *Cyprus Statistical Office*

Most dwellings that are used as permanent dwellings are single-family houses, i.e. approximately 130 thousand, followed by approximately 110 thousand apartments and 65 thousand terraced houses or two-family houses. There are another 8 thousand dwellings that are designated as 'other types of dwellings', which cannot be classified under the above categories.

Sixty eight per cent (68 %) of the dwellings are located in urban areas. There are great differences between urban and rural dwellings. The number of single-family houses is approximately the same in urban and rural areas, whereas most of the apartments (90 %) and two-family houses or terraced houses (62 %) are located in urban areas (Zangheri, 2016). Furthermore, it should be stressed in relation to the geographical distribution of dwellings that 78 % of them are located in seaside and lowland areas (Zangheri, 2016). As regards ownership, 67 % of the dwellings are used by their owners.

The size of the dwellings constructed tends to change in the course to time. The average floor area of single-family houses and terraced houses constructed after 2006 is larger than that of the ones constructed before 1981, whereas the exact opposite is true for apartments.

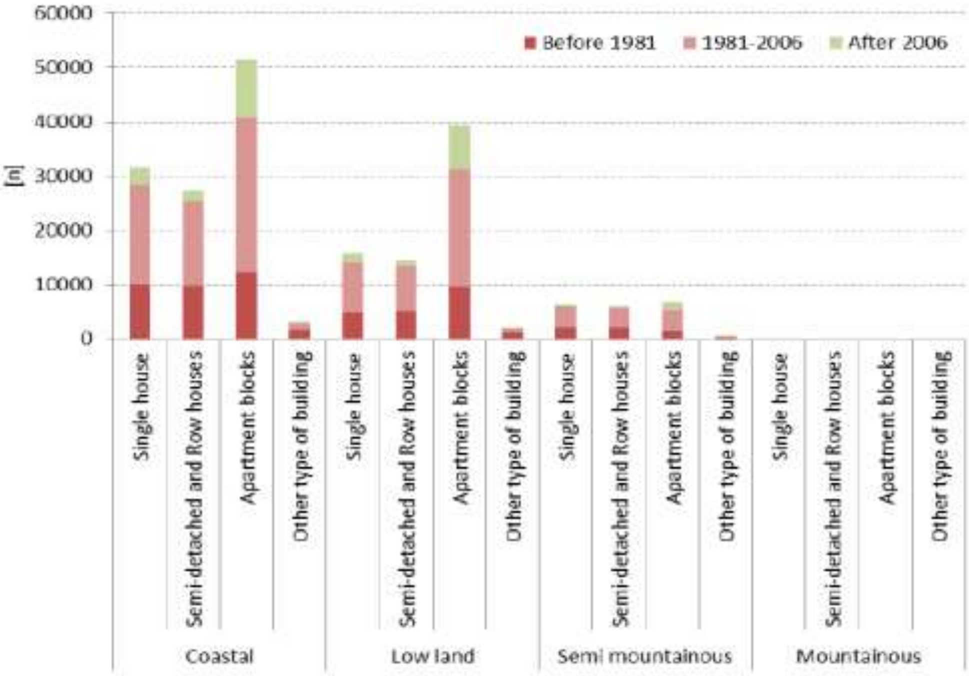
Table 2: Average floor area of dwellings per type and year of construction (Zangheri, 2016)

	Type of home	Year of construction	Average floor area (m^2)
Urban areas	Single-family house	Before 1981	95
		1981 - 2006	177
		After 2006	191
	Two-family houses and terraced houses	Before 1981	105
		1981 - 2006	125
		After 2006	132
	Apartments	Before 1981	92
		1981 - 2006	95
		After 2006	79
	Other types of homes	Before 1981	59
		1981 - 2006	44
		After 2006	44
Rural areas	Single-family house	Before 1981	105
		1981 - 2006	156
		After 2006	169

	Two-family houses and terraced houses	Before 1981	105
		1981 - 2006	127
		After 2006	133
	Apartments	Before 1981	76
		1981 - 2006	77
		After 2006	63
	Other types of homes	Before 1981	59
		1981 - 2006	51
		After 2006	58

Forty per cent (40 %) of dwellings in Cyprus were erected before 1981 and 54 % of them were erected between 1981 and 2006. That is, the vast majority of dwellings were constructed when there were no minimum energy performance requirements in force. Therefore, a poor to medium energy efficiency rating can be assigned to most dwellings, as the building owners did not take any measures in the construction of the building, while some home owners took savings measures afterwards, taking advantage mostly of the relevant grant schemes implemented by the Special Fund for RES and ES. Based on available statistics, no energy savings measures have been taken in 49 % of the dwellings, and some form of thermal insulation has been used on the building envelope only in 12 % of the dwellings. The situation is a bit better in terms of door and window frames, where 38 % of the homes have double glazing (Statistical Service of the Ministry of Finance, 2009).

Graph 1: Number of houses per type of home, per year of construction and meteorological zone - urban areas (Zangheri, 2016)


60000
50000
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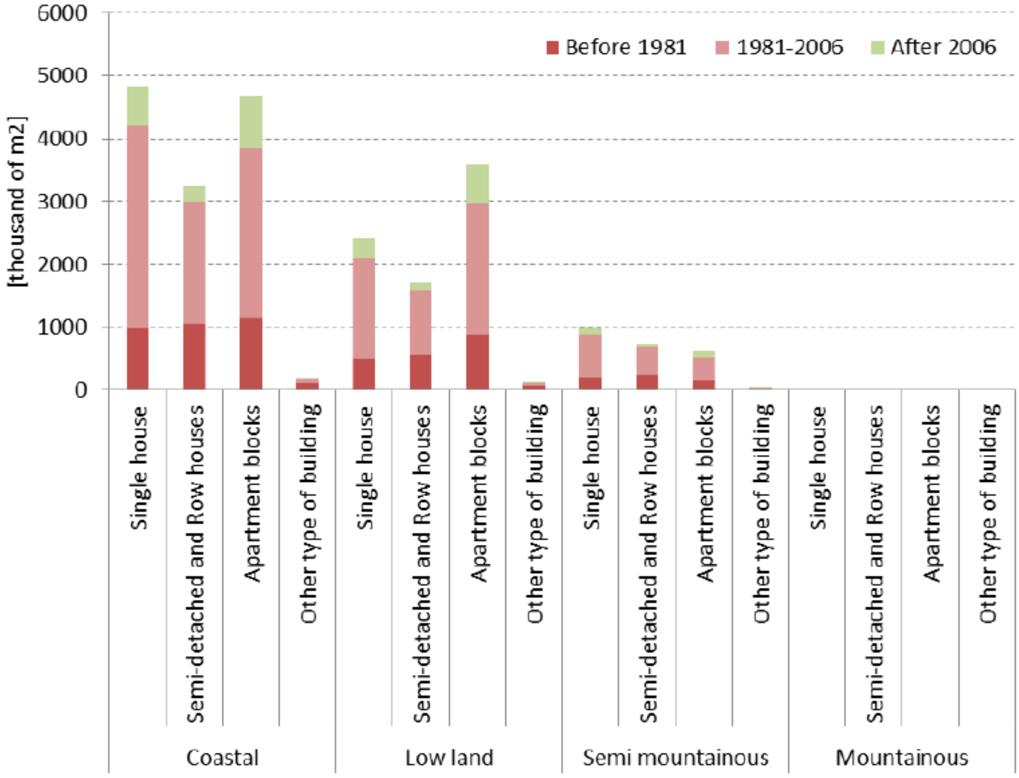
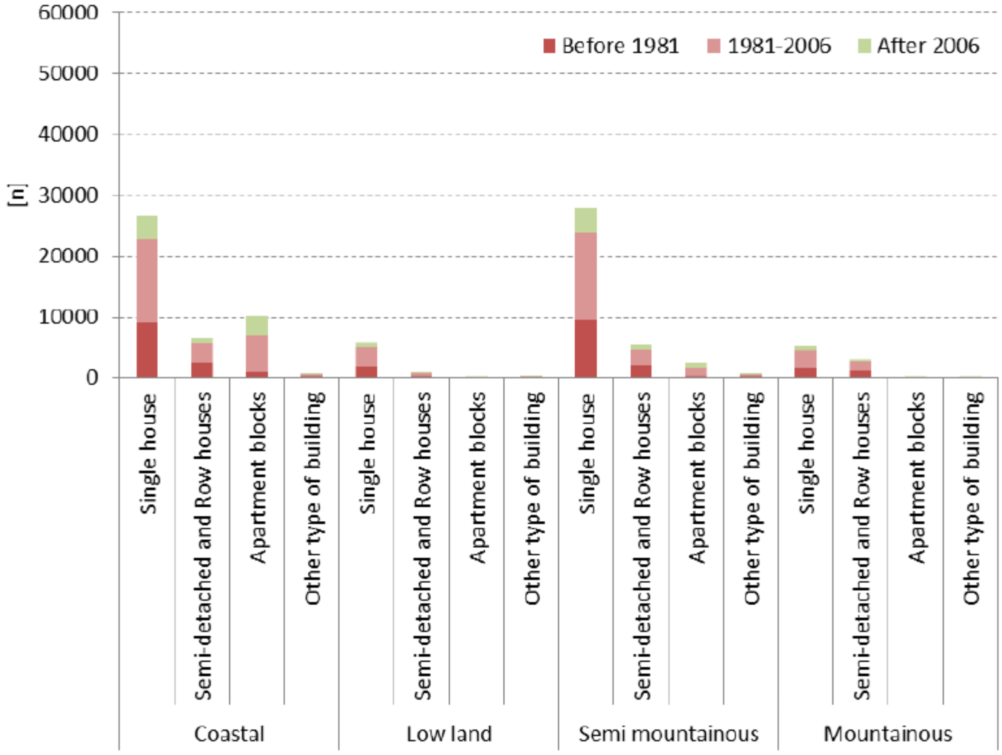
Before 1981
1981-2006
After 2006
Single house
Semi-detached and Row houses
Apartment blocks
Other type of building
Coastal
Low land
Semi mountainous
Mountainous

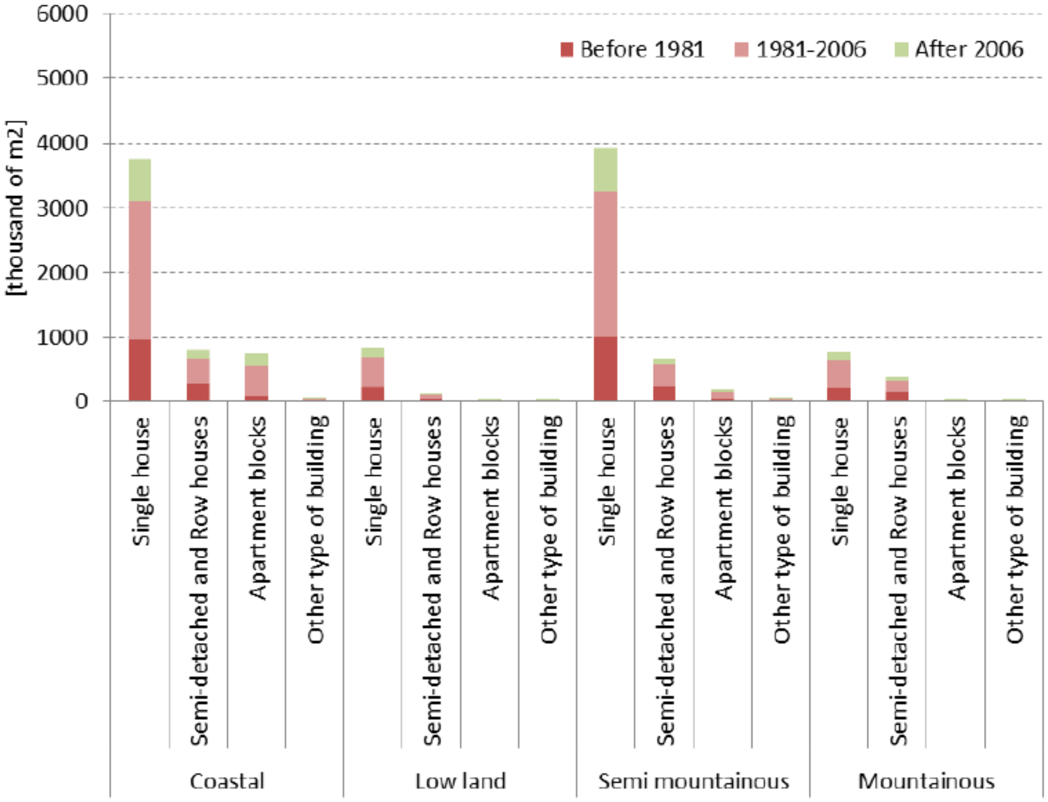
Graph 2: Total floor area per type of home, per year of construction and meteorological zone - urban areas (Zangheri, 2016)



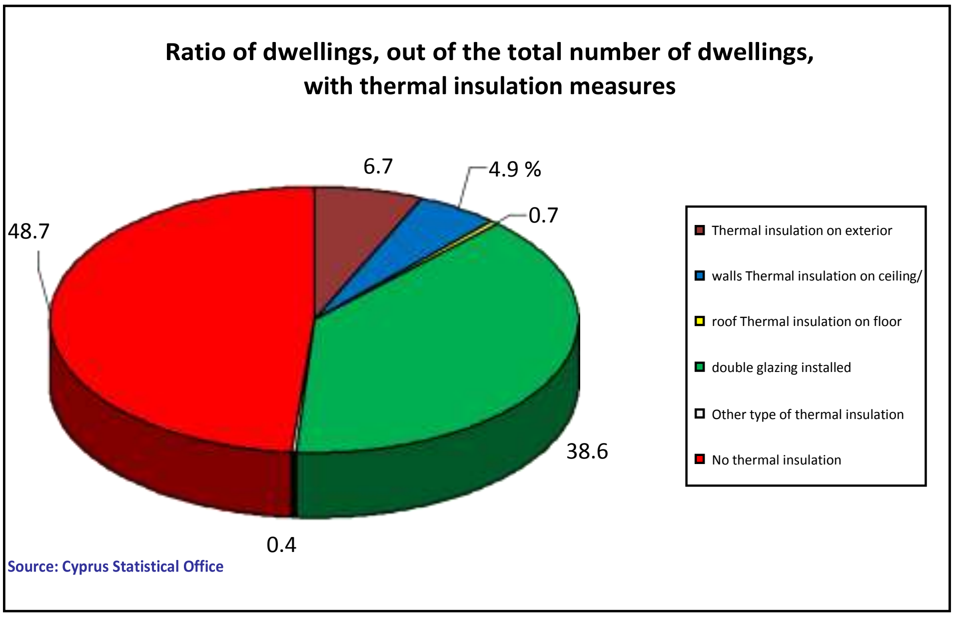
Graph 3: Number of houses per type of home, per year of construction and meteorological zone - rural areas (Zangheri, 2016)



Graph 4: Total floor area per type of home, per year of construction and meteorological zone - rural areas (Zangheri, 2016)



Graph 5: Ratio of dwellings with thermal insulation measures

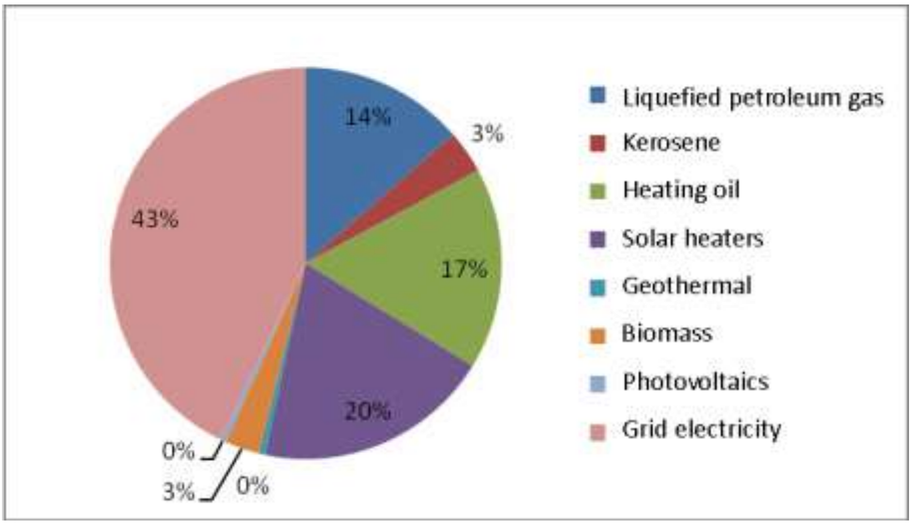


Source: Cyprus Statistical Office

The primary energy product used in the residential sector is grid electricity, as this accounts for almost half of the final energy consumption, followed by heating oil and liquefied gas, which are the most important energy products after electricity.

As regards renewable energy systems in dwellings, solar energy for hot water production is the most widely used system, as it represents 20 % of the final energy consumption. This is primarily due to the fact that there are solar water heaters installed for hot water production in 91 % of dwellings (Statistical Service of the Ministry of Finance, 2009). However, there is no information available on the age or performance levels of these systems. Photovoltaic systems have been installed on dwellings since 2004, initially with subsidised rates for the electricity generated and then by offsetting the electricity consumed against that generated. There are currently more than 11 000 photovoltaic systems installed on dwellings. However, photovoltaics and other RES systems, such as geothermal heat pumps and biomass systems, have a very small share in the final energy consumption of the residential sector, of the order of 4 % (Energy Service of the Ministry of Energy, Commerce, Industry and Tourism, 2017).

Graph 6: Ratio of energy product used in the residential sector



In a typical home, most of the energy is consumed by the air conditioning and heating systems, provided that thermal comfort conditions are ensured in the home (Ministry of Energy, Commerce, Industry and Tourism, 2013). The most widespread heating system in single-family houses is a central heating system with an oil boiler, as opposed to apartments, in which independent air conditioners are used for heating. Independent air conditioners are the most common air conditioning system used in summer months in all types of dwellings. However, half of the dwellings do not have any central heating system installed, and 18 % of the dwellings do not have an air conditioning system installed, which means that a large part of the households have settled for average to poor thermal comfort conditions (Zangheri, 2016).

Table 3: Type of heating system per type of home in urban areas, and in rural areas in parentheses (Zangheri, 2016)

Heating system	Fuel	Single-family house	Two-family houses and terraced houses	Apartments	Other types of homes
Central heating system with an oil boiler	Oil	41 % (27 %)	35 % (25 %)	17 % (5 %)	23 % (9 %)
Central heating system with a condensing boiler	Oil or liquefied gas	0 % (0 %)	0 % (0 %)	0 % (0 %)	0 % (0 %)
Oil stove	Oil	2 % (2 %)	2 % (2 %)	2 % (1 %)	1 % (2 %)
Central heating system with a liquefied gas boiler	Liquefied petroleum gas	3 % (3 %)	1 % (2 %)	0 % (1 %)	0 % (1 %)
Liquefied gas heater	Liquefied petroleum gas	11 % (17 %)	11 % (19 %)	9 % (13 %)	28 % (21 %)
Heat pump	Electricity	4 % (3 %)	4 % (2 %)	5 % (2 %)	0 % (2 %)
Heat pump with a ground source heat exchanger	Electricity	0 % (0 %)	0 % (0 %)	0 % (0 %)	0 % (0 %)
Independent air conditioners	Electricity	17 % (17 %)	23 % (19 %)	35 % (42 %)	14 % (19 %)
Independent high efficiency air conditioners	Electricity	4 % (4 %)	6 % (5 %)	9 % (11 %)	4 % (5 %)
Electric heater	Electricity	8 % (10 %)	9 % (12 %)	11 % (15 %)	20 % (29 %)
EAC storage heaters	Electricity	2 % (1 %)	3 % (1 %)	6 % (1 %)	0 % (0 %)
Fireplace	Biomass	4 % (13 %)	3 % (12 %)	1 % (2 %)	1 % (3 %)
No or other heating equipment	N/A	3 % (2 %)	2 % (2 %)	5 % (8 %)	7 % (9 %)

Table 4: Type of air conditioning system per type of home in urban areas, and in rural areas in parentheses (Zangheri, 2016)

Air conditioning system	Fuel	Single-family house	Two-family houses and terraced houses	Apartments	Other types of homes
Central system with a heat pump	Electricity	4 % (4 %)	4 % (4 %)	5 % (5 %)	0 % (0 %)
Central system with a ground source heat exchanger	Electricity	0 % (0 %)	0 % (0 %)	0 % (0 %)	0 % (0 %)
Independent air conditioners	Electricity	62 % (62 %)	62 % (62 %)	61 % (61 %)	65 % (65 %)
Independent high	Electricity	16 % (16 %)	16 % (16 %)	15 % (15 %)	16 % (16 %)

efficiency air conditioners					
No or other air conditioning equipment	N/A	18 % (18%)	18 % (18%)	18 % (18%)	18 % (18%)

Table 5 shows the estimated energy demand per type of home and construction period. As energy demand takes no account of the technical system used to meet the building occupants' needs, this table indicates how efficient the building envelope is in reducing energy consumption.

Table 5: Energy demand per type of home and year of construction (Zangheri, 2016)

	Year of construction	Space heating **(kWh / m^2 / year)**	Space cooling **(kWh / m^2 / year)**	Hot water **(kWh / m^2 / year)**
Single-family house	Before 1981	54	72	23
	1981 - 2006	40	54	18
	After 2006	36	50	15
Two-family houses and terraced houses	Before 1981	59	58	23
	1981 - 2006	43	44	18
	After 2006	39	40	15
Apartments	Before 1981	45	105	23
	1981 - 2006	33	84	18
	After 2006	30	76	15
Other types of homes	Before 1981	56	53	23
	1981 - 2006	41	41	28
	After 2006	37	38	15

2.2 Non-residential buildings

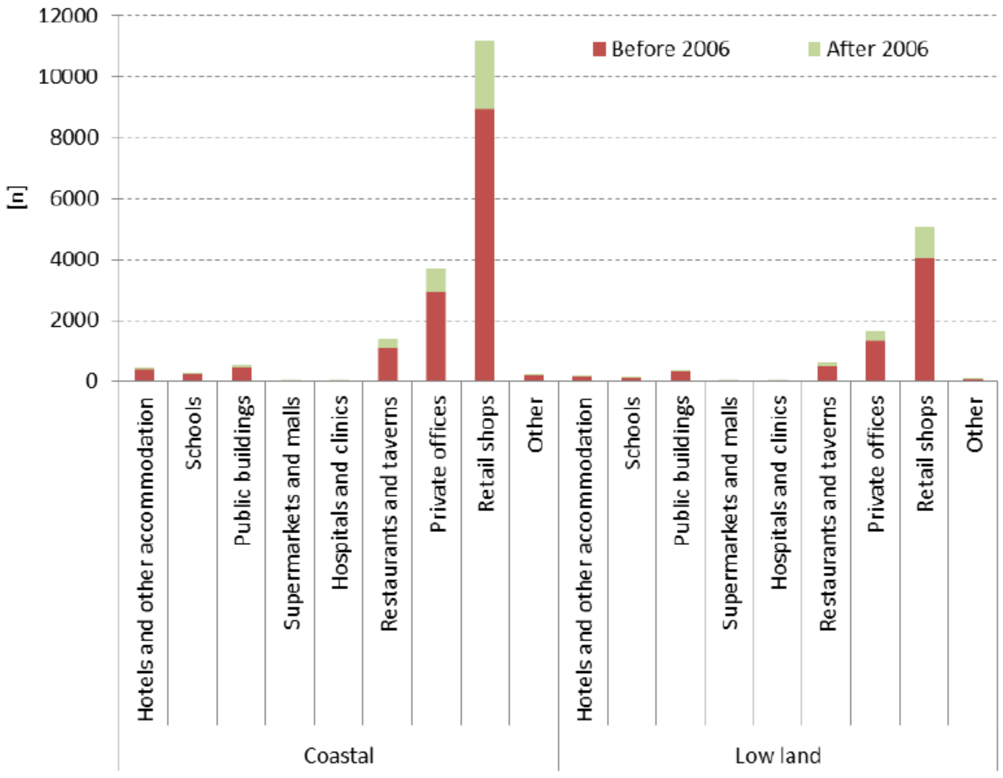
There are 30 thousand tertiary sector buildings in Cyprus, with a total floor area of 9 million square metres (Zangheri, 2016). Non-residential buildings include different types of buildings, notably offices, retail sales facilities and dining establishments. However, the largest category of buildings in terms of floor area is that of hotels and accommodation facilities, with 2 million square metres (Economidou, Report on the current status of the energy services market and proposals for measures to promote EPC in the public and private sector- JRC Technical Reports, 2016). Table 8 shows the total number and floor area of non-residential buildings.

Table 6: Total number and floor area of the most important types of non-residential buildings (Economidou, Report on the current status of the energy services market and proposals for measures to promote EPC in the public and private sector- JRC Technical Reports, 2016)

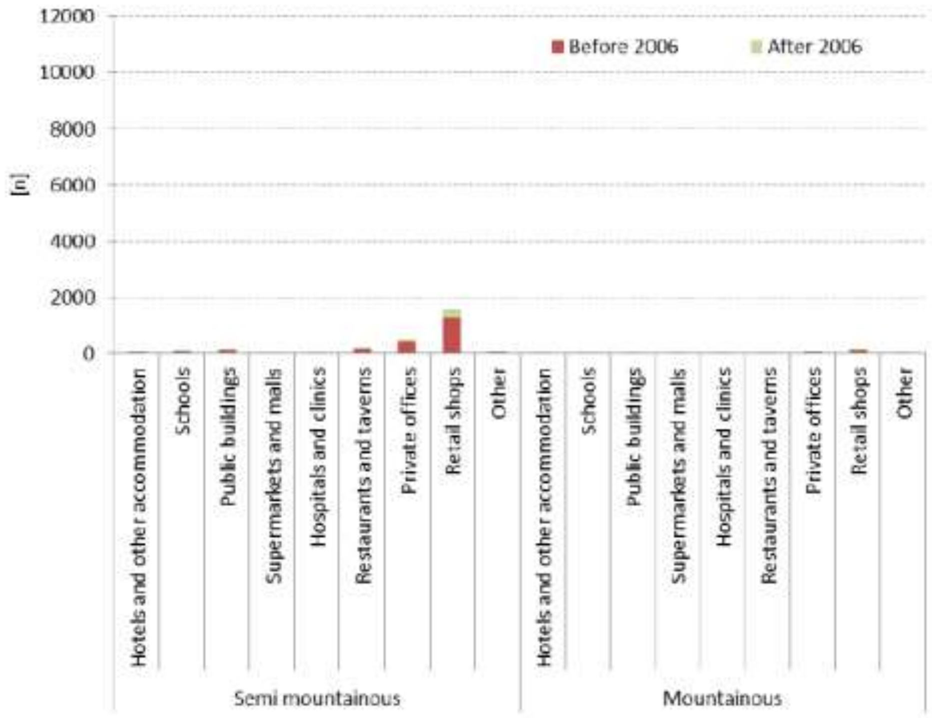
	Total floor area (m2)	Number of accommodation facilities	Average floor area (m2)
Hotels	2 094 134	766	2 734
Private offices	1 665 000	11 100	150
Retail sales facilities (stores)	1 080 000	18 000	60
Hospitals and clinics	485 898	83	17 354
Hypermarkets and compartment stores	280 396	67	4 185
Restaurants	179 360	2 242	80
Airports	119 600	2	59 800

Just like in the residential sector, 83 % of the buildings used for the provision of services or other business purposes were constructed before adopting any minimum energy performance requirements. The vast majority of non-residential buildings are located in coastal and lowland areas in Cyprus (meteorological zones 1 and 2).

Graph 7: Number of non-residential buildings per type in meteorological zones 1 and 2 (Zangheri, 2016)

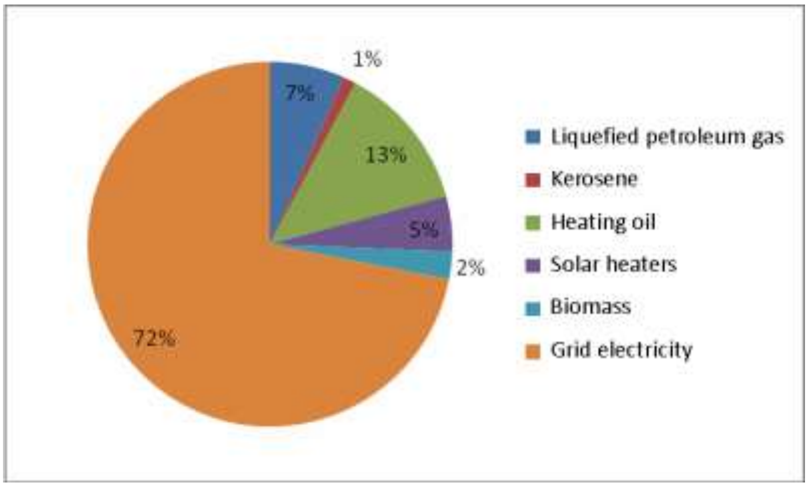


Graph 8: Number of non-residential buildings per type in meteorological zones 3 and 4 (Zangheri, 2016)



Two thirds of the total final energy consumption in non-residential buildings is covered by the use of grid electricity, where the use of RES in 2015 represented 7 % (Energy Service of the Ministry of Energy, Commerce, Industry and Tourism, 2017). The level of RES penetration in certain types of buildings is higher than the average level in tertiary sector buildings, i.e. in hotels, where 95 % of the buildings use solar energy for hot water production.

Graph 9: Ratio of the energy product used in the non-residential sector



The technical systems installed in tertiary sector buildings are different depending on the type of building. The most common heating system used in hotels is central a heating system with a boiler; in offices, stores and hypermarkets it is a central heating system with a heat pump. As regards air conditioning, most of the buildings examined used a central air conditioning system.

Table 7: Type of heating system per type of building (Zangheri, 2016)

	Fuel	Hotels	Private offices	Retail sales facilities (stores)	Hospitals and clinics	Hypermarkets and compartment stores	Restaurants
Central heating system with an oil boiler	Oil	43 %	41 %	12 %	31 %	11 %	28 %
Central heating system with a condensing boiler	Oil or liquefied gas	2 %	1 %	0 %	1 %	1 %	0 %
Central heating system with a liquefied gas boiler	Liquefied petroleum gas	10 %	4 %	2 %	4 %	1 %	3 %
Heat pump	Electricity	40 %	44 %	75 %	61 %	81 %	36 %
Heat pump with a ground source heat exchanger	Electricity	0 %	1 %	0 %	1 %	2 %	0 %
Independent air conditioners	Electricity	3 %	6 %	8 %	0 %	8 %	18 %
Independent high efficiency air conditioners	Electricity	1 %	1 %	1 %	0 %	1 %	5 %
No or other heating equipment	N/A	1 %	0 %	0 %	0 %	0 %	0 %

Table 8: Type of air conditioning system per type of building (Zangheri, 2016)

	Fuel	Hotels	Private offices	Retail sales facilities (stores)	Hospitals and clinics	Hypermarkets and compartment stores	Restaurant s
Central system with a heat pump	Electricity	62 %	54 %	75 %	68 %	88 %	42 %
Central system with a ground source heat exchanger	Electricity	0 %	1 %	0 %	1 %	2 %	0 %
Independent	Electricity	24 %	22 %	8 %	9 %	0 %	28 %

air conditioners							
Independent high efficiency air conditioners	Electricity	4 %	3 %	1 %	2 %	0 %	5 %
No or other air conditioning equipment	N/A	10 %	20 %	16 %	20 %	10 %	25 %

Table 9 shows the estimated energy demand per type of building.

Table 9: Energy demand per type of building and year of construction (Zangheri, 2016)

	Year of construction	Space heating (kWh / m^2 / year)	Space cooling (kWh / m^2 / year)	Hot water (kWh / m2 / year)	Lighting (kWh / m^2 / year)
Hotels	Before 2006	65	268	40	55
	After 2006	45	183	28	50
Private offices	Before 2006	87	203	5	45
	After 2006	59	138	4	40
Retail sales facilities (stores)	Before 2006	41	194	5	105
	After 2006	28	132	4	95
Hypermarkets and compartment stores	Before 2006	33	470	1	105
	After 2006	23	321	1	95
Restaurants	Before 2006	142	285	214	85
	After 2006	97	194	146	80

2.3 Public buildings

'Public buildings' means buildings used by:

I. central government authorities, such as ministries, the police and the Attorney General's office;
II. local authorities, such as municipalities and communities;
III. public schools, public universities and other educational establishments;
IV. the army.

'Central government authorities' means all administrative authorities whose jurisdiction covers the entire territory of the Republic of Cyprus and listed in Annex IV of the Coordination of Procedures for the Award of Certain Works Contracts, Supply Contracts and Service Contracts and Relevant Matters Law of 2006. The buildings used by central government authorities typically have a low energy efficiency rating, as most of these buildings are classified under categories C to H in accordance with the energy performance certificates already issued (Ministry of Energy, Commerce, Industry and Tourism, 2015).

Local authorities in the free areas of the Republic of Cyprus include 39 municipalities, 9 of them being occupied, and 350 communities. Most of the municipalities and larger communities only have one building used for administrative purposes and events. Larger municipalities, however, own several buildings intended for providing services to the general public, as well as other types of buildings, such as libraries and sports centres.

There are more than 800 public primary and secondary schools in Cyprus. The responsibility for the implementation of projects consisting in the construction of new schools and the maintenance and expansion of existing ones lies with the technical departments of the Ministry of Education and Culture. Most schools were erected before 2006. Almost all schools use a central heating system with a boiler for heating in winter, and there is no air conditioning in most classrooms (Zangheri, 2016).

As regards public universities, the University of Cyprus, which is the largest public university, owns the highest number of buildings, most of which were erected in the campus in recent years. The Cyprus University of Technology is housed mainly in historic buildings and rented ones in downtown Limassol, whereas the Open University of Cyprus is housed in a building in Nicosia. Public universities operate technical departments that are responsible for the maintenance and smooth functioning of their building facilities.

Table 10: Total number and floor area of public buildings (Zangheri, 2016)

	Total floor area (m2)	Number of accommodation facilities	Average floor area (m2)
Public buildings	1 886 370	1 087	1 735
Elementary schools	453 755	325	1 396
Junior and senior high schools and technical schools	613 546	144	4 261
Child care centres	96 376	419	230
Higher education	222 404	N/A	N/A

Table 11: Energy demand per type of building and year of construction (Zangheri, 2016)

	Year of construction	**Space heating (kWh / m^2 / year)**	**Space cooling (kWh / m^2 / year)**	**Hot water (kWh / m^2 / year)**	**Lighting (kWh / m^2 / year)**
Public buildings	Before 2006	49	44	5	42
	After 2006	34	30	4	37
Schools	Before 2006	35	55	7	35
	After 2006	24	37	5	30

2.4 Trends concerning the development of the building stock up until 2030

The technical report entitled ‘Building Stock in Cyprus and Trends to 2030’, as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism**,** provides an estimate of the development of the building stock in Cyprus up until 2030 unless there are policy changes made regarding the energy performance of buildings. This estimate is based on assumptions regarding:

I. the gross domestic product (GDP) increase;

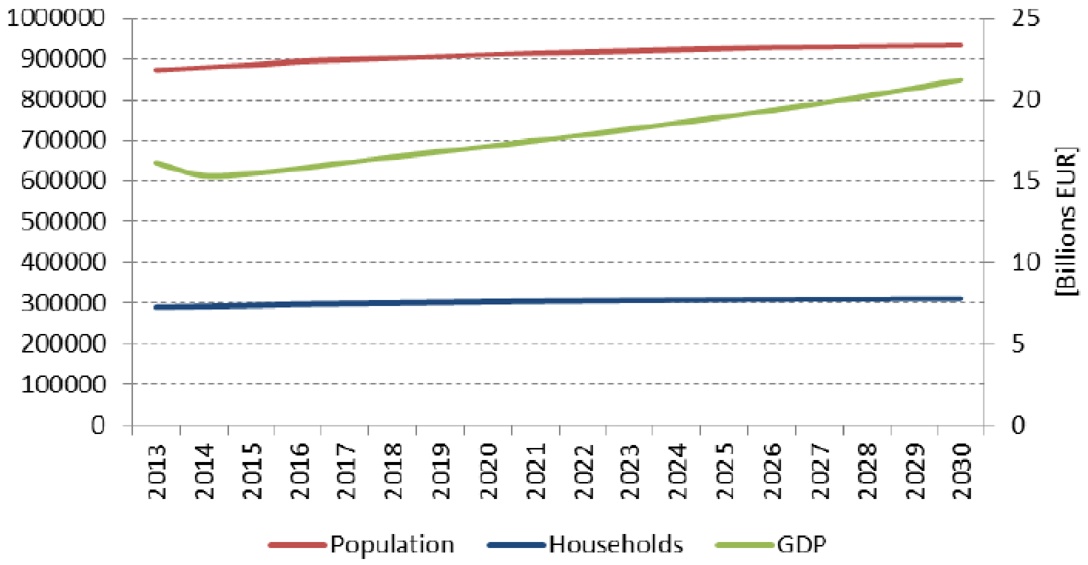
II. the population increase;

III. the number of new buildings erected annually;

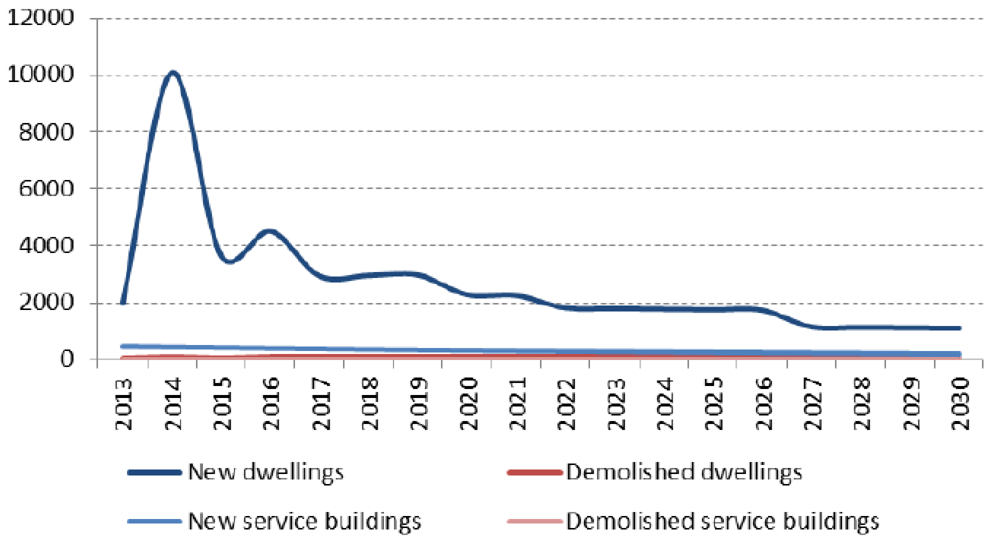
IV. the number of existing buildings demolished annually;

as shown in the following graphs.

Graph 10: Estimated increase in population, GDP and number of households by 2030 (Zangheri, 2016)

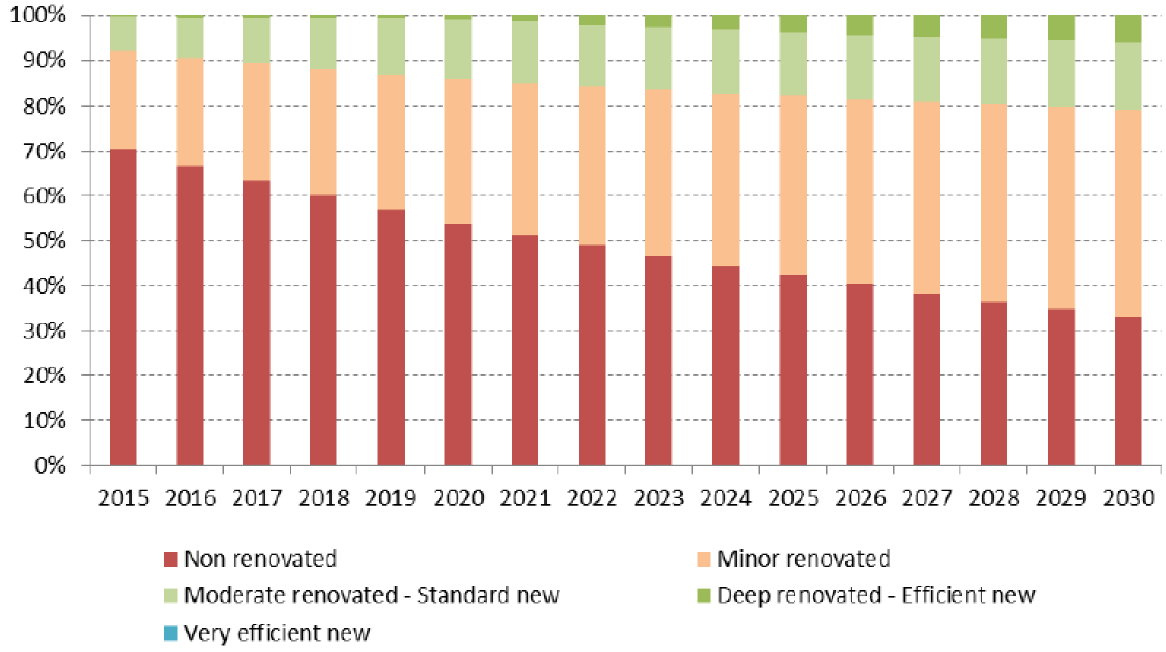


Graph 11: Estimated numbers of new buildings erected and of existing ones demolished by 2030 (Zangheri, 2016)

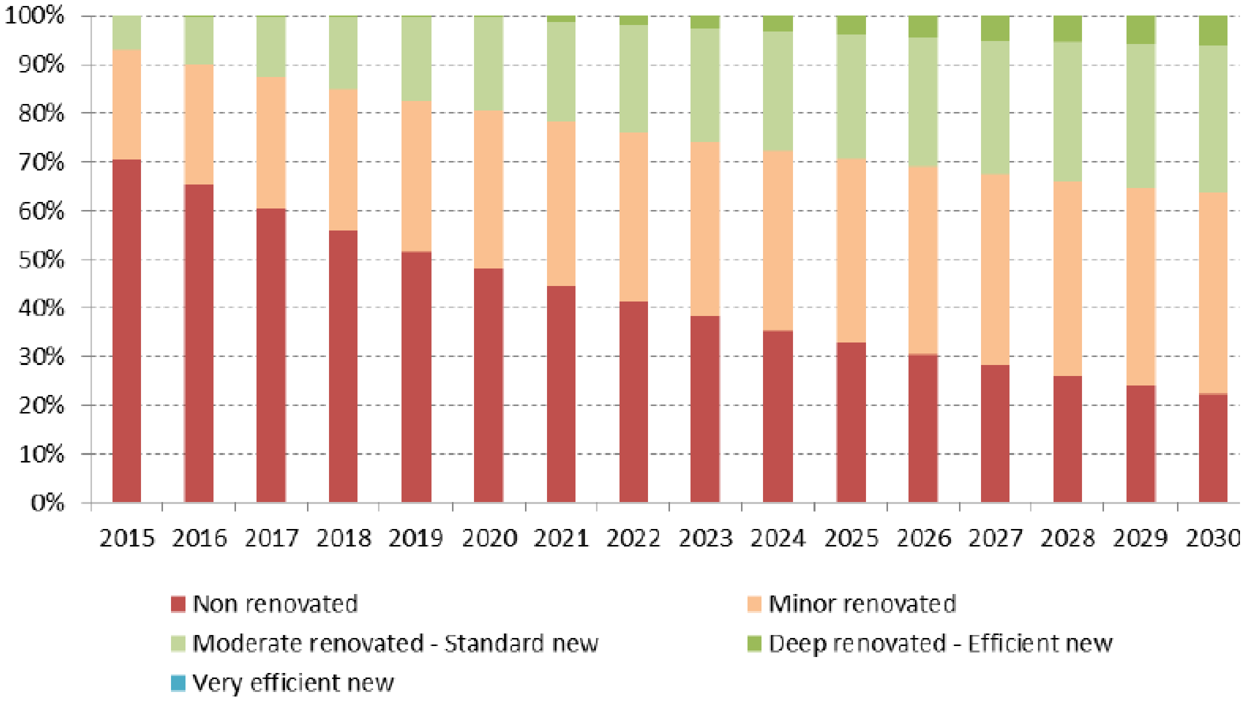


In view of the above, a baseline scenario was created regarding the development of the building stock up until 2030 in terms of energy performance. According to that scenario, up until 2030, a little more than 20 % of dwellings and 35 % of non-residential buildings will have a good energy efficiency rating, and a very small ratio of buildings will have a high energy efficiency rating.

Graph 12: Estimated ratio of dwellings to be renovated by 2030 - baseline scenarios (Zangheri, 2016)



Graph 13: Estimated ratio of tertiary sector buildings to be renovated by 2030 - baseline scenarios (Zangheri, 2016)



3. Cost-optimal approaches to renovation

The calculation of cost-optimal levels of minimum energy performance requirements for buildings, as made under Article 5 of Directive 2010/31/EU on the energy performance of buildings (recast), offered an opportunity to look into the cost-optimal building renovation methods, also taking into account the initial capital expenditure and the operating cost over the lifecycle of the building. Moreover, in recent years there have been recorded data on the energy upgrading of buildings which was carried out through such financing programmes as the 'Save & Upgrade' programme and the 'ENERGEIN' project. This chapter sets out cost-effective and technically practical measures for improving the energy performance of buildings, whether calculated or applied in practice.

3.1 Calculation of cost-optimal levels of minimum energy performance requirements

To make possible the calculation of cost-optimal levels of minimum energy performance requirements for existing buildings, seven reference buildings were created: two single-family houses, two multi-apartment buildings, two office buildings and a retail sales facility. The aim was for these buildings to be most representative of the typical and average existing building stock. These are virtual buildings and are based on available statistics and on the views of architects, engineers, contractors and other professionals in the sector, as obtained by the preceding consultation.

The calculations were made for meteorological zone 2, as defined in the 'Calculation Methodology of the Energy Efficiency of Buildings'. The methodology breaks down the territory of Cyprus into four meteorological zones. Zones 1, 2 and 3 have similar climatic characteristics and, therefore, similar energy consumption levels[9]. Zone 4 (areas with an altitude of more than 600 m) is very different from the other zones, as the energy needs for heating in the same home are three times higher and the air conditioning needs are 70 % lower than in the other zones (Exergia SA, 2012). However, there are only 24 289 homes and only 3 % of the population lives in zone 4 (Statistical Service of the Ministry of Finance, 2011).

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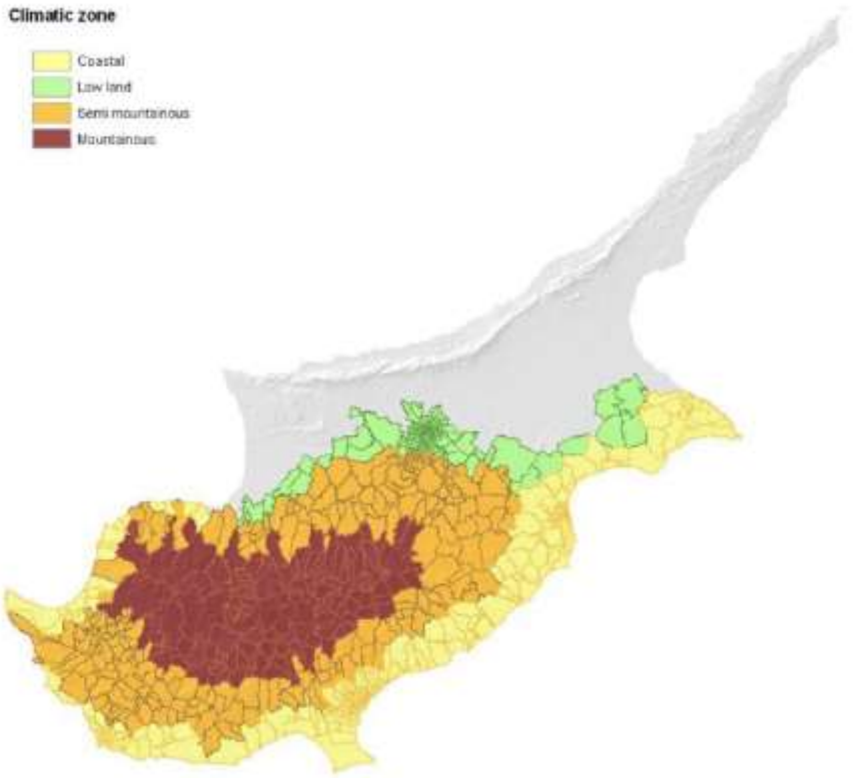
[9] Zone 1 includes coastal areas, zone 2 includes lowland areas, zone 3 includes semi-mountainous areas, and zone 4 includes mountainous areas.

Graph 14: The climatic zones of Cyprus for the purpose of calculating the energy performance of buildings (Zangheri, 2016)



Following are examples of cost-optimal, over the lifecycle of a building, combinations of energy savings measures that can be implemented as part of a major renovation, based on the results of the calculations concerned. Please note that these examples reflect the cost of energy and materials at the time when the calculations were made, i.e. in 2013, and the energy consumption level reflects the average potential use. Therefore, the examples give a general picture, as the energy savings interventions and the installation of RES systems in buildings must be looked into in relation to the data of each case. Moreover, the implementation of the measures listed below may achieve other objectives too, which are unrelated to energy savings, such as the beautification of facades, the replacement of building elements whose lifecycle has ended, etc. It is estimated that, by implementing the savings measures in the context of a scheduled large-scale renovation, the initial capital expenditure required only for energy purposes must be considered as being 30 % lower than the cost referred to below.

(1) One-floor single-family house with a floor area of 193 m2, with a level roof (typical home in the 1980s)

Description of construction prior to any intervention:

- Roof: Concrete, no thermal insulation (U=4.27W/m^{2}K)
- Pillars / beams: Concrete, no thermal insulation (U=3.33W/m^{2}K)
- Walls: Typical 20 cm brick (U=1.38W/m^{2}K)
- Frames: Aluminium frames with single glazing, no thermal break system (U=6W/m^{2}K)
- Shading: External moving shades
- Heating system: Central heating system with radiators and an oil boiler with an efficiency rating of 80 %
- Air conditioning system: Independent air conditioners with a cooling efficiency rating of 2.5
- Hot water system: The same oil boiler as that used for heating, and solar panels
- Lighting: Compact fluorescent lamps
- Energy efficiency class in the energy performance certificate: H

One-floor single-family house with a floor area of 193 m2, with a level roof (typical home in the 1980s) - energy consumption and costs before renovation			
	Electricity (kWh)	Oil (litres)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	-	1 930	115 277
Air-conditioning	10 576	-	
Hot water	-	185	
Lighting	3 686	-	
Total	14 262	2 115	

Savings measures and initial cost:

- ✓ Installation of 8 cm thick thermal insulation on the roof (U=0.34W/m^{2}K) EUR 6 347
- ✓ Installation of 7 cm thick thermal insulation on the walls, pillars and beams (U=0.34W/m^{2}K) EUR 7 604
- ✓ Replacement of boiler with a liquefied gas condensing boiler EUR 1 900
- ✓ Replacement of air conditioners with high efficiency ones EUR 2 012
- ✓ New energy efficiency class in the energy performance certificate: B
- ✓ Total initial cost = EUR 17 863

One-floor single-family house with a floor area of 193 m2, with a level roof (typical home in the 1980s) - energy consumption and costs after renovation			
	Electricity (kWh)	Liquefied gas (kg)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	-	498	40 467
Air-conditioning	1 351	-	
Hot water	-	117	
Lighting	3 686	-	
Total	5 034	615	

(2) Two-floor single-family house with a floor area of 195 m2, with a pitched tile roof (typical home in the 1990s)

Description of construction prior to any intervention:

- Pitched tile roof, no thermal insulation (U=1.72W/m^2K)
- Pillars / beams: Concrete, no thermal insulation (U=3.33W/m^2K)
- Walls: Typical 20 cm brick (U=1.38W/m^2K)
- Frames: Aluminium frames with single glazing, no thermal break system (U=6W/m^2K)
- Shading: No external shades
- Heating system: Central heating system with radiators and an oil boiler with an efficiency rating of 80 %
- Air conditioning system: Independent air conditioners with a cooling efficiency rating of 3.2
- Hot water system: The same oil boiler as that used for heating, and solar panels
- Lighting: Compact fluorescent lamps
- Energy efficiency class in the energy performance certificate: D

Two-floor single-family house with a floor area of 195 m2, with a pitched tile roof (typical home in the 1990s) - energy consumption and costs before renovation			
	Electricity (kWh)	Oil (litres)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	-	1 342	66 997
Air-conditioning	4 192	-	
Hot water	-	177	
Lighting	3 042	-	
Total	7 234	1 519	

Savings measures implemented:

- ✓ Installation of 8 cm thick thermal insulation on the roof (U=0.31W/m^{2}K) EUR 4 091
- ✓ Installation of 7 cm thick thermal insulation on the walls, pillars and beams (U=0.34W/m^{2}K) EUR 8 510
- ✓ Replacement of boiler with a liquefied gas condensing boiler EUR 1 900
- ✓ Installation of a photovoltaic system with a capacity of 2kW EUR 3 400
- ✓ New energy efficiency class in the energy performance certificate: B+
- ✓ Total initial cost = EUR 17 901

Two-floor single-family house with a floor area of 195 m2, with a pitched tile roof (typical home in the 1990s) - energy consumption and costs after renovation			
	Electricity (kWh)	Liquefied gas (kg)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	-	520	30 940
Air-conditioning	2 145	-	
Hot water	-	111	
Lighting	3 032	-	
RES-based electricity generation	-3 744	-	
Total	1 433	631	

(3) Office building with a floor area of 1 448 m2

Description of construction prior to any intervention:

- Roof: Concrete, no thermal insulation (U=1.99W/m^{2}K)
- Pillars / beams: Concrete, no thermal insulation (U=1.1W/m^{2}K)
- Walls: Typical 20 cm brick (U=W/m^{2}K)
- Frames: Aluminium frames with double glazing, no thermal break system (U=3.8W/m^{2}K)
- Shading: No external shades
- Heating and air conditioning system: Independent air conditioners with a cooling efficiency rating of 2.2 for heating and 2 for cooling
- Hot water system: Instantaneous hot water, no storage
- Lighting: Compact fluorescent lamps
- Energy efficiency class in the energy performance certificate: G

Office building with a floor area of 1 448 m2 - energy consumption and costs before renovation			
	Electricity (kWh)	Oil (litres)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	36 489	-	706 693
Air-conditioning	52 852	-	
Hot water	4 199	-	
Lighting	80 074	-	
Ventilation	-	-	
Total	173 614	-	

Savings measures implemented:

- ✓ Installation of 12 cm thick thermal insulation on the roof (U=0.22W/m^{2}K) EUR 15 693
- ✓ Installation of 12 cm thick thermal insulation on the walls, pillars and beams (U=0.20W/m^{2}K) EUR 36 930
- ✓ Installation of frames with double glazing and a panel with an increased thermal efficiency rating (U=2.25W/m^{2}K) EUR 62 478
- ✓ Installation of fixed shades on the frames with a south and east orientation EUR 17 282
- ✓ Replacement of air conditioners with high efficiency ones EUR 43 000
- ✓ Installation of energy efficient lamps EUR 2 750
- ✓ Installation of a photovoltaic system with a capacity of 10kW EUR 17 000
- ✓ New energy efficiency class in the energy performance certificate: B
- ✓ Total initial cost = EUR 195 133

Office building with a floor area of 1 448 m2 - energy consumption and costs after renovation		
	Electricity (kWh)	Total energy costs over the lifecycle of the building, current values (EUR)
Heating	1 1873	322 590
Air-conditioning	17 810	
Hot water	4 199	
Lighting	55 748	
RES-based electricity generation	-18 824	
Total	70 806	

3.2 Examples of buildings whose energy performance was improved

The programme 'Energy Efficiency in Low Income Housing in the Mediterranean' (ELI-MED) aims to identify cost-optimal approaches to the energy upgrading of buildings through pilot applications and focuses on low-income households in the Mediterranean area. In the context of that project, 25 pilot applications were implemented in dwellings in Cyprus after assessing their energy efficiency rating, and energy savings measures were then implemented. Smart meters were installed in the buildings to allow for assessing the results and comparing the estimated energy savings (ELI-MED Project). The results to date indicate savings levels between 30 % and 40 %. There are three different types of dwellings listed below as examples of gradual renovations which, if implemented in a targeted fashion, can yield great results in terms of energy and money savings.

(1) Single-family house with a floor area of 150 m2 in Dali (climatic zone 2)
Year or construction: 1985
Energy efficiency class in the energy performance certificate: E
Savings measures implemented:

- ✓ Installation of 7 cm thick thermal insulation on the roof EUR 7 530
- ✓ Replacement of air conditioners with high efficiency ones EUR 1 770
- ✓ Total initial cost = EUR 9 300

New energy efficiency class in the energy performance certificate: C
Estimated energy savings: 43 %

(2) Terraced house with a floor area of 128 m2 in Aradippou (climatic zone 1)
Year or construction: 1992
Energy efficiency class in the energy performance certificate: E
Savings measures implemented:

- ✓ Installation of 7 cm thick thermal insulation on the roof EUR 6 669
- ✓ Replacement of solar water heater EUR1 400
- ✓ Total initial cost = EUR 8 069

New energy efficiency class in the energy performance certificate: C
Estimated energy savings: 35 %

(3) Apartment with a floor area of 94 m2 in Agios Athanasios (climatic zone 1)
Year or construction: 2007
Energy efficiency class in the energy performance certificate: G
Savings measures implemented:

- ✓ Replacement of ordinary fireplace with an energy efficient one EUR 5 000
- ✓ Replacement of incandescent lamps with compact fluorescent lamps EUR 100
- ✓ Total initial cost = EUR 5 100

New energy efficiency class in the energy performance certificate: E

Estimated energy savings: 29 %

An example of good practice for commercial buildings is the Hellenic Bank, which converted 10 branches into ‘energy-friendly branches’, as it calls them. The measures implemented in these branches included the installation of thermal insulation on the roof, thermally insulated glazing, new class A air conditioners, as well as LED lamps and illuminated signs. Thanks to these measures, the amounts of energy consumed in these branches dropped by 50 % to 60 %. Also, the actions taken by the Bank and its staff in other buildings ensured savings of EUR 416 000 (or 18 %) in 2013 compared to 2012.

The costs of the energy upgrading works carried out in the 10 branches, the State grant requested and the pay-off period are as follows:

- Total cost of energy upgrading works: EUR 663 404
- Additional cost of energy upgrading works compared to typical cost: EUR 270 854
- State grant requested: EUR 163 532
- Pay-off period: 1.5-2.5 years.

The works and costs for a branch are detailed below:

1. Cost of energy interventions
    - Thermal insulation on roof: EUR 6 750
    - Thermally insulated front windows and aluminium frames EUR 10 396
    - Air conditioners with a high energy efficiency rating EUR 14 107
    - State grant requested: EUR 8 522
2. Energy savings: 63 %
3. Pay-off period: 1-2 years.

Companies and organisations with similar activities and/or similar buildings could reduce their energy consumption levels and operating costs by resorting to similar approaches.

Good practice examples for public sector buildings can be found in the context of the SERPENTE project, aimed at the energy upgrading of various types of public sector buildings. The Cyprus Energy Agency, whose partners include local authority bodies, is the project coordinator in Cyprus. Following are two examples of applications implemented in Cyprus:

(1) Municipal library of Strovolos (climatic zone 2)

The building was constructed in 1915 and has been designated as a listed historic building. The building was first used as a school, then as a slaughterhouse and finally as the City Hall of Strovolos up until 1993, when it was abandoned. In 2011-2012, the building was renovated, and the energy savings measures implemented included installing 5 cm thick thermal insulation on the roof, interior thermal insulation on the walls, double glazing on the north and east sides, sunlight blocking films on the west-oriented window panes, a geothermal heat pump for heating and cooling, and an electronic energy management system. The total cost of the measures stood at EUR 290 000 and the pay-off period is estimated at 4 years.

(2) Olympic swimming facility 'Tassos Papadopoulos' in the Municipality of Geroskipou (climatic zone 1)

The sports facility was constructed in 2004 and, despite the thermal insulation measures implemented in the building, no heating and air conditioning efficiency measures were taken in designing it. The rise in energy prices brought about a significant increase in the cost incurred for heating the swimming pool, thus putting at risk the sustainability of the swimming facility. Solar panels and a geothermal pump were installed in 2008, to reduce the amounts of energy derived from conventional fuels. As a result, the consumption of heating oil dropped by 20 % (30 000 to 40 000 litres per year). The cost of the project stood at EUR 132 000 and the pay-off period is estimated at 4 years.

4. Policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations.

The policies and measures to stimulate the mobilisation of investment in the renovation of existing buildings can be broken down into legislative measures, incentives, training measures and information measures. An analysis of the current state of play is provided below, and the relevant obstacles along how to overcome them are identified.

4.1 Legislative measures

The most important legislative measures for the energy upgrading of existing buildings relate to the provisions of the Regulation on the Energy Performance of Buildings Laws of 2006 to 2017 and the regulatory and administrative acts adopted on the basis thereof. The minimum energy performance requirements include requirements for existing buildings. The first decree on the minimum energy performance requirements, as adopted in 2007, provided for the mandatory energy upgrading only of buildings with a floor area of more than 1 000 m2 undergoing major renovation, as it required that the same level of thermal insulation should be installed on the building envelope elements as that required for a new building. The minimum requirements were amended in 2009, adding the requirement for issuing energy performance certificates with a minimum class B for buildings with a floor area of more than 1 000 m2 undergoing major renovation. A new decree was adopted in December 2013, reducing the U-values by 15 % both for buildings with a floor area of more than 1 000 m2 undergoing major renovation and for the building elements that are installed subsequently or are replaced irrespective of the size of the building. As of 1 January 2017, all buildings undergoing major renovation must be classified under energy efficiency class B. If the energy upgrading to that minimum level is not technically and/or financially feasible, a study should be prepared to explain why.

Table 12: Minimum energy performance requirements for existing buildings

		Minimum Energy Performance Requirements Decree of 2007 (RAA 568/2007) In force since 21/12/2007	**Minimum Energy Performance Requirements Decree of 2009 (RAA 446/2009)** In force since 1/1/2010	**Minimum Energy Performance Requirements Decree of 2013 (RAA 432/2013)** In force since 11/12/2013	**Minimum Energy Performance Requirements Decree of 2016 (RAA 119/2016)** In force since 1/1/2017
Major renovation	**Walls and load-carrying structure**	0.85 W / m^2 K only for buildings with a floor area of more than 1 000 m2	0.85 W / m^2 K only for buildings with a floor area of more than 1 000 m2	0.72 W / m^2 K only for buildings with a floor area of more than 1 000 m2	-
	Ceiling and exposed floors	0.75 W / m^2 K only for buildings with a floor area of more than 1 000 m2	0.75 W / m^2 K only for buildings with a floor area of more than 1 000 m2	0.63 W / m^2 K only for buildings with a floor area of more than 1 000 m2	-
	Overlying floors in closed non-air conditioned spaces	2.0 W / m^2 K only for buildings with a floor area of more than 1 000 m2	2.0 W / m^2 K only for buildings with a floor area of more than 1 000 m2	2.0 W / m^2 K only for buildings with a floor area of more than 1 000 m2	-
	Frames	3.8 W / m^2 K	3.8 W / m^2 K only for buildings with a floor area of more than 1 000 m2	3.23 W / m^2 K only for buildings with a floor area of more than 1 000 m2	-
	Maximum shade coefficient for frames	-	-	0.63 only for buildings with a floor area of more than 1 000 m2	-
	Minimum energy efficiency class in the energy performance certificate	-	B only for buildings with a floor area of more than 1 000 m2	B only for buildings with a floor area of more than 1 000 m2	B for all buildings
Building elements that are replaced or installed subsequently	**Walls and load-carrying structure**	-	-	0.72 W / m^2 K for all buildings	0.4 W / m^2 K for all buildings
	Ceiling and exposed floors	-	-	0.63 W / m^2 K for all buildings	0.4 W / m^2 K for all buildings
	Overlying floors in closed non-air conditioned spaces	-	-	2.0 W / m^2 K only for buildings with a floor area of more than 1 000 m2	-
	Frames	-	-	3.23 W / m^2 K for all buildings buildings	2.9 W / m^2 K for all buildings
	Maximum shade coefficient for frames	-	-	0.63 for all buildings	-
	Minimum energy efficiency class in the energy performance certificate	-	-	-	-

Under the law, to sell and rent buildings and building units, an energy performance certificate is required and a copy thereof must be provided to the new tenant or buyer. Also, the energy efficiency class of a building must be indicated in commercial advertisements when the building is offered for renting or sale. Energy performance certificates have been issued to date for approximately 34 thousand buildings and building units. However, the issuance of energy performance certificates for the purposes of sale or renting is low. This can be attributed to the following reasons:

(i) no legislation in force to associate the energy performance certificate with the deed of sale or rental;

(ii) no information on the energy performance certificate provided to would-be buyers or tenants of buildings;

(iii) would-be buyers or tenants of buildings, owners and real estate professionals find it difficult to 'translate' the data shown on the energy performance certificate into building operating costs;

(iv) relatively low value added to the selling or rental price that the building owner can secure due to its high energy efficiency rating.

The above obstacles have not allowed the energy performance certificate to gain full momentum as an indicator that affects the value of properties and, ultimately, fostering the energy upgrading of existing buildings. The situation has improved since 2015, primarily due to associating financing incentives with the issuance of an energy performance certificate, such as in the case of the 'Save & Upgrade' programme, and secondarily due to a step-up in controlling compliance with the legislation and imposing administrative fines on the part of the Ministry of Energy, Commerce, Industry and Tourism. For example, 27 % of all the energy performance certificates issued in 2015 related to existing buildings, as opposed to 7 % in previous years.

The gradual deep renovation of existing buildings and the enhancement of energy efficiency tend to cut down on operating costs in the following years. There is an additional incentive for implementing savings measures in buildings offered for sale or renting, as this can make them stand out in the real estate market and give them a comparative advantage. Issuing an energy performance certificate is a reliable way to evidence the energy upgrade. The economic crisis that affected the real estate market was added to the problems referred to above in respect of getting the energy performance certificate established among consumers. The large number of available buildings and the drop in family income has encouraged the market to focus on reducing selling and rental prices, while ignoring operating costs. The emerging change in the economic environment and the creation of a more competitive market in terms of property sales and rentals are expected to increase the importance of energy efficiency.

The mandatory periodic inspection of air conditioning and heating systems is yet another measure that can contribute towards the energy upgrading of existing buildings. Inspection is mandatory for heating systems with a boiler with a rated output of more than 20kW and air conditioning systems with a rated output of more than 12kW, or in buildings with an aggregate rated output of more than 50kW. Inspection is carried out by air conditioning system inspectors or heating system inspectors, as the case may be. Inspection aims to detect problems relating to the dimensioning, maintenance and functioning of the system that tend to waste energy, and make technical and economic recommendations for energy savings. These recommendations are recorded in the inspection report delivered by the inspector to the building tenant.

A provision was adopted in 2015 and 2013, respectively, for the periodic checking, adjustment and functioning of these systems, as a complement to the inspection of air conditioning and heating systems. Two guides that have been issued for each system describe the works and controls to be carried out by the technical staff. Also, to further enhance the energy efficiency of technical systems installed or upgraded in existing buildings, energy performance requirements were adopted in 2016 by the Energy Service both for these systems and their individual components. The requirements relate, in addition to air conditioning and heating systems, to hot water and large ventilation systems insofar as this is technically, functionally and financially feasible.

Energy auditing of buildings, as carried out by authorised energy auditors, offers a more holistic approach than that offered by the three other independent experts in the field of the energy performance of buildings (qualified experts, air-conditioning system inspectors and heating system inspectors), as it must be based on updated and measurable operating data regarding energy consumption in the building and must include a detailed overview of the characteristics of that consumption. The training and authorisation of energy auditors started in the second half of 2013. Periodic energy audits are mandatory for large undertakings, as an energy audit must be carried out by 5 December 2015 and must be repeated every four years thereafter. The regulations on energy service providers (ESPs) were adopted in April 2014, to increase confidence in energy audits among stakeholders, as well as in the alternative ways of financing energy savings measures resulting from energy audits, by means of energy performance contracting (EPC). To date, there are 60 energy auditors for buildings and 24 ESPs.

The level of activity of energy auditors and ESPs is very low. This may be due to a lack of confidence on the part of end users in the process and to a lack of know-how and experience on the part of ESPs. Moreover, the relatively small size of the market, the high interest rates, the lack of access to financing, under the current financial conditions in particular, are also important factors that prevent the market from growing. Graph 15 summarises the general obstacles relating to the energy services market. These are broken down into the following themes: information and awareness, institutional and legislative obstacles, financial obstacles, market-related and external obstacles, technical and administrative obstacles, and behavioural obstacles.

Graph 15: Roadblocks to the development of the offer of energy services for the energy efficiency of buildings (Economidou, Report on the current status of the energy services market and proposals for measures to promote EPC in the public and private sector- JRC Technical Reports, 2016)

Information and awareness-raising	institutional and legislative obstacles	financial obstacles	external factors	Technical and administrative	Behavioural
• Absence of successful applications • Limited information to customers on ESPs and the EPC model • Limited information on the financing options • Underestimating the benefits of energy performance improvement	• Public procurement rules • Legislation countering energy performance • Absence of certification mechanisms for energy performance certificates	• Difficulty in accessing financing • Limited funds available or funds available from banks at high rates • Contractual rules on financing are not in line with the EPC model • Lack of experience of the financial sector in EPC financing	• Low energy prices • High risk compared to other investment options • Usually only small-scale projects available on the market • Large number of buildings that are rented or owned by several owners	• Complex administrative procedures • High transactional costs • Complex verification of future savings • Lack of knowledge and experiences in EPC projects	• Customers unwilling to take the risk associated with the implementation of an EPC • Low confidence in ESPs • Opting for finding solutions within the organisation • Unwillingness to take up long-term loans

The technical ‘Report on the current status of the EPC market and proposal for measures that will promote EPC in the public and private sector’, as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism, has proposed a number of measures for the growth of the services market. The measures are summarised below:

(i) strengthening the current legal and institutional framework, such as by removing obstacles to public procurement and making the recording of energy consumption in public buildings mandatory;
(ii) promoting training and information by creating standard EPC forms and setting up an information platform for ESPs;
(iii) improving access to financing by creating new financing products.

As regards energy consumption measurement, the energy savings officers are currently an important source of information on the energy efficiency rating of government buildings through the annual reports they prepare (see more information on energy savings officers in par. 4.5). To ensure more accurate energy consumption measurements, the Department of Electrical and Mechanical Services has installed smart meters in buildings in which EPCs will be implemented and is making plans for the installation of smart meters in another one hundred public buildings. Moreover, the Department of Electrical and Mechanical Services is making plans, through the structural programmes, for installing energy management systems in 15 buildings and interconnecting them centrally with a view to monitoring, adjusting and controlling the operating parameters of electrical and mechanical equipment.

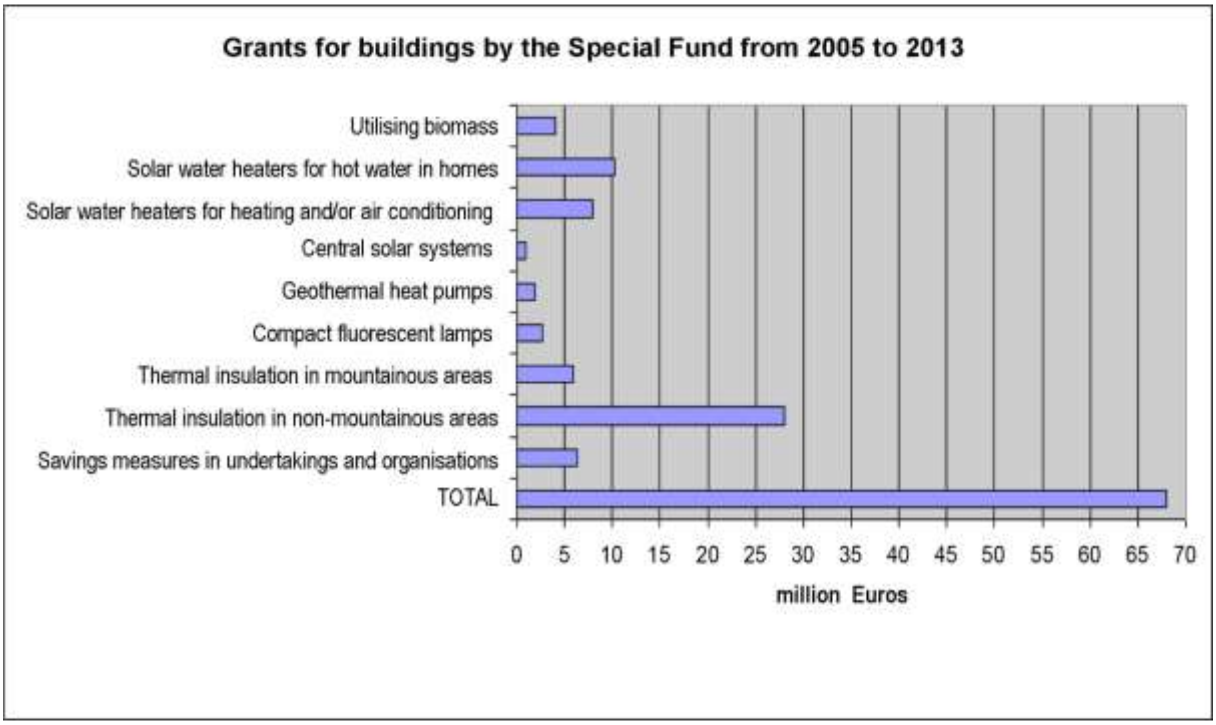
To further enhance energy efficiency in companies, and private and public organisations, the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism is promoting the 'energy manager' arrangement. A decree adopted in 2016 has defined the training and duties of energy managers. An energy manager's duties include, among other things, proposing actions and making recommendations to an organisation's management for reducing energy consumption. This helps increase energy efficiency on a voluntary basis through a company's, organisation's or government authority's own procedures too.

The penetration of RES systems is also part of the upgrading of existing buildings. To promote the use of renewable energy, a certification system has been established for installers of small-scale RES systems carrying out the installation and/or maintenance of small-scale biomass boilers and heaters and/or photovoltaic and solar thermal systems and/or shallow geothermal systems and heat pumps. To date, a training provider for photovoltaic system installers and another one for installers of small-scale biomass boilers and heaters have been authorised. In addition to that, the Energy Service has, following consultation with the stakeholders, prepared draft regulations setting out the qualifications and obligations of installers of heating, air conditioning, major ventilation and hot water production systems.

4.2 Incentives

The grant schemes of the Special Fund for RES and ES were put in place from February 2004 to the end of 2013 and a total or EUR 100 million was granted for investments implemented by natural and legal persons and public sector bodies engaging in economic activity. An estimated €67 million was granted as an economic incentive for the implementation of RES and ES measures in buildings, such as thermal insulation, door and window frames, energy efficient lighting, heat recovery, automation and RES systems in air conditioning and heating. Graph 9 shows a breakdown of the grant granted by the Fund to date[10]. The Fund derives its income from imposing an energy fee per kWh of electricity consumed on all end consumers.

Graph 16: Grants from the Special Fund for RES and ES per type of measure implemented



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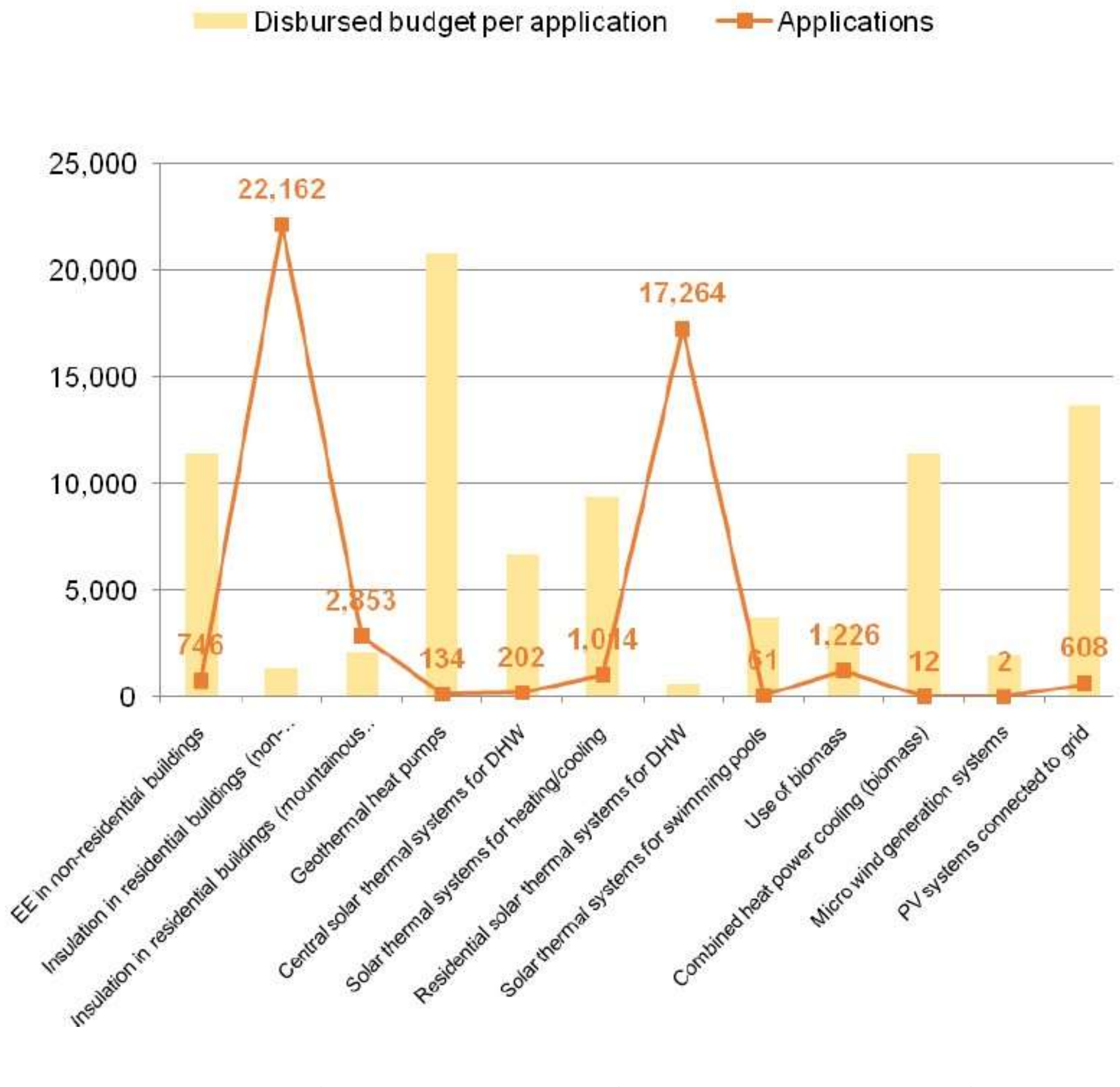
[10] The grant granted for the installation of photovoltaic systems in buildings is not included

Since the minimum energy performance requirements were put in force in 2008, the Fund kept subsidising savings measures only for existing buildings and RES systems intended for heating and cooling in new and existing buildings. The energy savings to be included in the lifecycle of the buildings through the implementation of measures financed by the Special Fund are estimated to reach 1 million tons of oil equivalent (TOE).

Graph 17: Grants from the Special Fund for RES and ES per annual number of applications and grant amount in residential sector (Economidou, Financing energy efficiency in buildings in Cyprus - JRC Technical Report, 2016)



Upon discontinuation of the grant schemes for the implementation of energy savings measures in buildings through the Special Fund for RES and ES in 2013, a new grant scheme was put in place in 2014 to encourage households and small and medium-sized enterprises (SMEs) to adopt energy efficiency and renewable energy measures. The 'Save & Upgrade' programme finances major renovation of dwellings and buildings owned or used by SMEs, which had requested a building permit before 21 December 2007, i.e. before the entry into force of the initial minimum energy performance requirements. The programme has a budget of EUR 15.3 million for the period 2014-2020 for SMEs and EUR 16.5 million for households and is co-financed by the European Regional Development Fund (ERDF) for SMEs or by the Union’s Cohesion Fund (CF) for households.

As opposed to the previous grant scheme individual for individual intervention measures, the new scheme provides financial support for a set of measures aimed to upgrade the building to a minimum energy efficiency level. This minimum level means that a building should, after the measures are implemented, be classified under class B in the energy performance certificate or should have achieved a 40 % reduction in primary energy consumption in accordance with the energy performance certificate. A higher grant is given for buildings that are renovated into nearly zero-energy buildings (NZEBs). A higher grant is given to vulnerable consumers wishing to upgrade to energy efficiency class B or to achieve a 40 % reduction in primary energy consumption, and they are also entitled to individual grant measures, such as thermal insulation on the ceiling and changing door and window frames. An estimated 1138 dwellings and 164 SME buildings will undergo energy upgrading as of the 1st call issued in the context of the ‘Save & Upgrade’ programme. On the basis of the assessment of results to be made by the Directorate-General for European Programmes, Coordination and Development, the plan will be revised and a 2nd call will follow.

Another incentive is Order No 1 of 2014, as issued by the Minister for Interior on the basis of the Town and Country Planning Law. In accordance with the Order, in the case of new buildings and buildings undergoing renovation, it is possible to increase the building rate by 5% for energy class A buildings, and at least 25% of their total energy needs will be covered from renewable energy sources, i.e. at least two of the criteria laid down for NZEBs must be met.

The installation of photovoltaic systems in buildings started in 2005 with grants from the Special Fund against the installation cost and the energy generated. Reduced photovoltaic prices and increased electricity tariffs have turned the development model for these systems to methods associating production with consumption, which is expected to foster also the installation of smart meters and power accumulators. The ‘Solar energy for all’ programme started in 2013, aiming to promote photovoltaic installations for meeting own electricity needs. Up until the end of 2015, it was possible to install a photovoltaic system with a maximum capacity of 3kW in dwellings. In December 2015, the programme was revised to include all types of buildings and to increase the maximum permissible capacity of the photovoltaic system to 5kW. Where these systems are installed, the electricity consumed by the building is offset against that generated by the photovoltaic system (net metering). It is also possible to install larger photovoltaic systems (10kW to 10MW), in which case offsetting takes place every 20 minutes. To date, more than 11 000 photovoltaic systems have been installed in buildings using the net metering method, and the aim is to have another 70MW installed by 2020, which corresponds to 15 000 buildings.

The current financial support policy for improving the energy performance of existing buildings largely depends on State subsidisation for households, undertakings and the public sector. Please note that certain deficiencies in the previous grant scheme of the Special Fund for RES and ES are addressed in the 'Save & Upgrade' programme. For example, the 'Save & Upgrade' programme provides for major renovation financing, meaning that the buildings falling under the current scheme are not at risk of 'blocking' the entire energy savings potential of the building. Furthermore, the provision for participation of the qualified experts and energy auditors in the scheme boosts energy efficiency in the market and promotes a holistic and cost-effective approach when measures are chosen for intervention in each building (Economidou, Financing energy efficiency in buildings in Cyprus - JRC Technical Report, 2016).

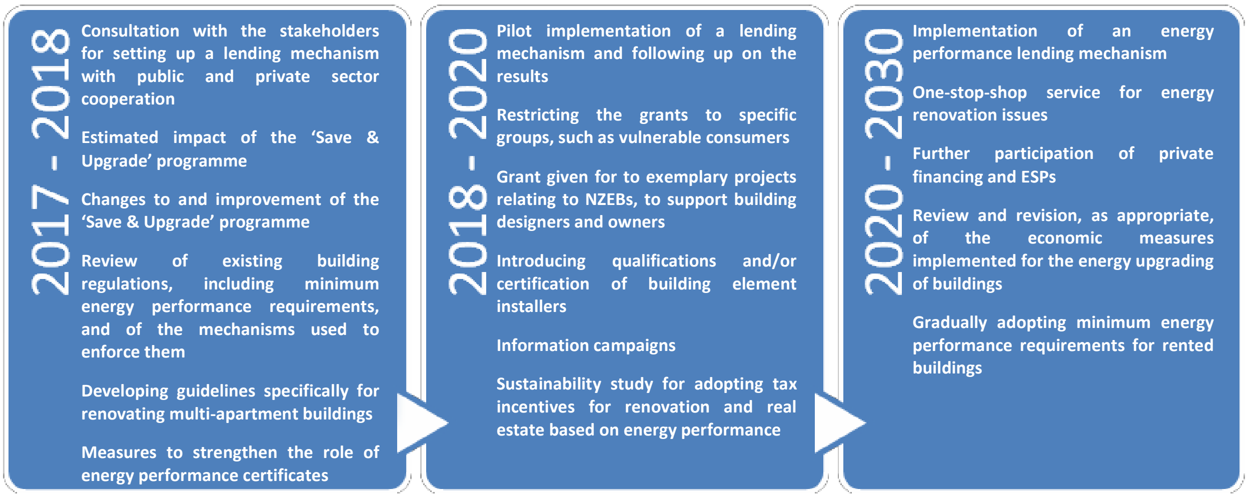
Table 13: Average investment and average grant given under the 'Save & Upgrade' scheme for dwellings (Economidou, Financing energy efficiency in buildings in Cyprus - JRC Technical Report, 2016)

Type of energy upgrading	Average investment (EUR)	Average grant(EUR)
NZEBs	39 633	21 800
Energy efficiency class B	23 773	9 595
At least 40 % energy savings	20 857	8 505
Individual measures	4 081	1 887

However, ensuring maximum investment requires a higher share of private financing and solutions that are based on market mechanisms. Therefore, energy upgrading projects must meet the different criteria that are mandatory for financing from the financial sector, and the banking sector must also become acquainted with the concept of energy upgrading of existing buildings. The technical report entitled ‘Financing energy efficiency in buildings in Cyprus’, as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism provides an analysis of the existing incentives and an assessment of their cost and energy effectiveness, also proposing a roadmap for a transition to financing measures that are more based on market mechanisms. Greater mobilisation of private capital is very important, in accordance with the report, and proposals for improving the situation are being made. This parameter will be reconsidered in the impending restructuring of the ‘Save & Upgrade’ programme in view of the 2nd call to be issued.

Events were also organised, where commercial banks were informed of matters relating to the energy performance of buildings, both by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism and by professionals in the field. The aim is to intensify these contacts and the exchange of views in order to find solutions satisfying all stakeholders, including building owners.

Graph 18: Measures considered for enhancing financing incentives by 2030 (Economidou, Financing energy efficiency in buildings in Cyprus - JRC Technical Report, 2016)



2017 - 2018

- Consultation with the stakeholders for setting up a lending mechanism with public and private sector cooperation
- Estimated impact of the ‘Save & Upgrade’ programme
- Changes to and improvement of the ‘Save & Upgrade’ programme
- Review of existing building regulations, including minimum energy performance requirements, and of the mechanisms used to enforce them
- Developing guidelines specifically for renovating multi-apartment buildings
- Measures to strengthen the role of energy performance certificates

2018 - 2020

- Pilot implementation of a lending mechanism and following up on the results
- Restricting the grants to specific groups, such as vulnerable consumers
- Grant given for to exemplary projects relating to NZEBs, to support building designers and owners
- Introducing qualifications and/or certification of building element installers
- Information campaigns
- Sustainability study for adopting tax incentives for renovation and real estate based on energy performance

2020 - 2030

- Implementation of an energy performance lending mechanism
- One-stop-shop service for energy renovation issues
- Further participation of private financing and ESPs
- Review and revision, as appropriate, of the economic measures implemented for the energy upgrading of buildings
- Gradually adopting minimum energy performance requirements for rented buildings

4.3 Training measures

The training of all professionals involved in the energy performance of buildings, in the energy upgrading of existing buildings in particular, is a fundamental measure for fostering investments in this sector. Professionals engaging primarily in the design of buildings and of technical building systems, including RES systems, and the persons responsible for the installation of building elements that affect energy performance are the most important players.

Designating qualified experts as the parties responsible for calculating the energy efficiency rating of buildings and issuing energy performance certificates and making recommendations in 2009 was an opportunity for providing architects as well as civil, mechanical and electrical engineers with training on the energy performance of buildings. Despite the absence of any provision on training in the qualifications for qualified experts, the Energy Service organised dozens of training seminars to prepare the parties concerned for the relevant examination. The seminars intended for qualified experts concerning dwellings lasted for 16 hours and covered topics relating to legislation, energy efficiency calculation and cost-optimal measures for improving the energy performance of buildings. In the period 2009-2013, a total of 1 074 persons attended these seminars, only 220 of them being qualified experts, which shows that a large number of engineers and architects used them for purely educational purposes. Building energy auditors must necessarily attend and successfully complete, following an examination, an 80-hour long theoretical and practical training session. Training sessions are conducted by organisations authorised by the Energy Service. These organisations include a partnership between the University of Cyprus and the Cyprus Energy Agency, as well as the Frederick University. The training provided to engineers and architects is enhanced by numerous laboratories, workshops and discourses organised by universities, the Cyprus Scientific and Technical Chamber (ETEK), professional associations and other organisations focusing on buildings and energy.

The training sessions are necessary for setting up a critical pool of professionals to foster the energy performance of buildings, also taking into account that many technical university schools attended by today’s engineers did not include the energy performance of buildings in their curricula. Universities in Cyprus have taken important steps towards including this knowledge in their curricula, to better prepare new scientists intended to work in the construction industry. Some typical examples include the course 'Energy resources and energy performance of buildings' offered to undergraduate students of engineering at the Cyprus University of Technology and the MSc in 'Energy systems and the Built Environment' offered by the School of Engineering and Applied Sciences of the Fredrick University. However, academic programmes and training sessions focusing on the energy upgrading of existing buildings are rarely offered. The effort made by the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism, through its cooperation with universities, aims to offer better training opportunities at an academic and professional level concerning the energy upgrading of existing buildings, including technical, environmental and economic parameters, in the years to come.

As regards building element installers, vocational education and training is provided to them through initial and ongoing training programmes. The average technical and professional training provided by technical schools also includes branches directly associated with the energy performance of buildings, such as mechanical engineering, electrical engineering and construction. The training courses that are related to the energy performance of buildings have followed a slightly upward trend in recent years, while the ratios of graduates engaging in related professional activities have also been on the rise. However, the ratio of enrolments in secondary and technical vocational training is still one of the lowest ones in the European Union (Build up skills, Cyprus, 2012).

Training for the construction industry is also provided to technical staff by the apprenticeship system, the new modern apprenticeship system and the post-secondary institutes for technical and vocational education and training (MIEEKs). The apprenticeship system is a two-year programme offered to young people who have not successfully completed secondary education and wish to be employed in technical occupations. The occupations for which the apprenticeship system provides training are specified each year in accordance with the number of classrooms and trainers available. The new modern apprenticeship system, which has been fully implemented since 2015, aims to address the needs of the economy by increasing the number of qualified workers. The MIEEKs, which were put in operation in 2012, offer a one- or two-year initial training programme for young people wishing to acquire or improve or upgrade their professional skills. The occupations for which training is provided by the MIEEKs also include some relating to the energy performance of buildings, such as home automation technician and photovoltaic installation and maintenance technician. Also, the Human Resource Development Authority of Cyprus offers short initial training programmes, for 21 to 25 weeks, including theoretical and practical training through the training establishment for occupations in which there is a significant shortage in the labour market. These programmes give priority to the long-term unemployed. These programmes include training for construction workers, plumbers, aluminium frame technicians and electrical installers.

Ongoing education and training is offered to building elements installers through the evening and night departments of technical schools. Adult professionals are given a chance to attend one-year programmes leading to the acquisition of a certificate of competence, or three-year long programmes leading to the acquisition of a certificate equivalent to that offered by technical schools. Also, public and private training organisations offer a number of specialised training programmes for technicians in the building sector. These programmes are authorised and financed by the Human Resource Development Authority of Cyprus, and the participants are given a certificate of attendance.

According to the roadmap developed in the context of the 'Build up skills – Pillar I' initiative, there is a need to provide 'green' training to at least 4 500 workers for 13 different skills until 2020, to achieve the national targets for the energy performance of buildings. Following 'Build Up Skills - Pillar I', the bodies responsible for the implementation of the project 'WE-Qualify: Improve skills and qualifications in the building workforce relating to the energy performance of buildings', taking into account the 'roadmap', completed the integrated planning and trial implementation of five training courses for three different skills: (i) installation of thermal insulation, (ii) installation of frames and sunlight protection systems, and (iii) installation of biomass boilers and heaters. The main objective of the WE-Qualify project was to assist the construction sector in Cyprus to address the lack of skills among the workforce in relation to the construction of energy-efficient buildings, as well as to contribute towards the attainment of the targets for promoting renewable energy technologies.

The most significant obstacles to the quantitative and qualitative improvement of installers and the methods used to address them are listed below:

(i) Absence of regulation of technical occupations: Until recently, the only regulated technical occupations in the building sector were those of electrical installer and cooling technician. The regulations already in force for installers of small-scale RES systems and the promotion of regulations for installers of heating, air conditioning and hot water systems referred to in par. 4.1 are expected to tackle the issue of insufficient regulation. The standard professional qualifications established by the Human Resource Development Authority of Cyprus for the construction industry are helpful in this respect. The standard professional qualifications lay down the skills and knowledge that installers must have. Examinations are held to grant professional qualification certification to those wishing to take such an examination. Please note that the standard professional qualifications also cover installers of thermal insulation and door and window frames, for which there is no legislative regulation at all.

(ii) Financing: The companies active in the construction industry have been seriously affected by the ongoing economic crisis, thus being unable to spend any resources on training. There have been considerable layoffs in the industry, thus creating a climate of employment uncertainty that makes any effort for improvement and/or acquisition of knowledge and skills untimely. Moreover, a number of installers are self-employed and do not pay contributions to the Human Resource Development Fund, thus not being entitled to financing for the vocational training seminars authorised by the Human Resource Development Authority of Cyprus. One of the measures adopted by the Ministry of Labour and Social Insurance in cooperation with the Human Resource Development Authority of Cyprus to address the situation consists in implementing a number of programmes financed with Community and national funds. These programmes aim to provide the unemployed with training through short programmes or through temporary employment with employers participating in the programme, in economic sectors which appear to be in need of qualified staff.

(iii) Infrastructure for vocational education and training, and trainers: Trainers and training facilities must be in line with the technological advancements in respect of the energy performance of buildings and market demands. Trainers must keep increasing their knowledge of new technologies, and nobody knows how many trainers have specialised building renovation knowledge and to what extent. In certain cases, the laboratory infrastructure of public and private sector training bodies is outdated and needs to be assessed and upgraded as appropriate. This problem was partly addressed by the implementation of the 'WE-Qualify' project, as its deliverables include training materials and guides for installer trainers. Also, the implementation of pilot training programmes has helped upgrade the laboratory infrastructure of participating bodies.

4.4 Information measures

The energy status of buildings concerns all people in Cyprus, as they all use buildings either for residential purposes or as workplaces or to provide services. The general public's knowledge of issues relating to the energy performance of buildings appears to be improving in the course of time by the implementation of financing incentives and legislative measures, whereas the dramatic increase in energy prices has been pivotal in that improvement. However, many people are unaware of the energy consumption level of their building and of the resulting costs. Even where these facts are known, it is still hard to assess, let alone to detect, the cause of the irrational waste of energy, in order to determine the optimal solutions to the problem.

An energy performance certificate aims to inform the parties concerned of the energy efficiency rating of their building. However, issuing that certificate is mandatory only when buildings are constructed, sold or rented. Thus, a large part of the building stock – e.g. homes, which are mostly privately owned – is excluded. Also, although it is mandatory to produce an energy performance certificate when a building is sold or rented, many would-be buyers and tenants are unaware of this requirement, thus obtaining it only following completion of the sale and purchase agreement or not obtaining it at all. The Ministry of Energy, Commerce, Industry and Tourism organises information campaigns on the energy performance certificate. It has been recognised, though, that the relevant effort must be ongoing and intensified, as it takes time for the general public to become acquainted with the fact that producing an energy performance certificate is necessary and advantageous when selling or renting property. The provision of information on the energy performance certificate must include all the parties involved, i.e. building owners, tenants, would-be buyers, real estate agents and property evaluators. Experience from previous years has shown that the information efforts should focus particularly on would-be buyers and tenants as, of all the parties involved, they are the ones to bear the energy costs, thus the energy performance certificate being the only reliable source of information for them.

Moreover, the Energy Service has issued dozens of information leaflets for the general public, both in hard copy and electronic format, concerning the energy performance certificates, energy audits, NZEBs and other important topics relating to the energy performance of buildings. To ensure more effective communication with the public, the Energy Service has used the social media, and a new website is currently under construction. It also organises and participates in one-day information workshops.

In recognition of the fact that more can be done in terms of providing information, the Ministry of Energy, Commerce, Industry and Tourism has secured technical assistance from the Gesellschaft für Internationale Zusammenarbeit (GIZ) for planning an energy performance information campaign. The aim is to provide appropriate and timely information, adapted to each specific target group, such as households, undertakings, local authorities, etc. The results of the study will be used as a criterion for the information measures to be implemented afterwards.

A measure that is expected to increase the energy consumption information available to building occupants (tenants and owners) is promoting smart meters. The Electricity Authority of Cyprus (EAC), i.e. the sole electricity provider in Cyprus, promotes the installation of such meters, also including in the invoices issued to consumers such information as a comparison of the amount of electricity consumed in the same period last year and energy savings tips.

Information on energy consumption and the resulting costs is undoubtedly a first step for encouraging building owners to take savings measures. A second step is to identify the technical solutions that are cost-optimal. Chapter 3 gives some examples, but each building has its own specific characteristics and needs to be examined separately. Due to lack of information, building owners often turn for solutions to suppliers of savings materials and technologies and RES systems. However, it is hard for these suppliers to be objective, given their capacity. The problem is worse in existing buildings in which individual measures are implemented, usually without obtaining the services of a consultant/designer engineer. An energy auditor aims to fill this gap by giving an independent and substantiated opinion to the building owner. Qualified experts also play the same role by issuing energy performance certificates and making recommendations for existing buildings, without, however, requiring the same extent of analysis, which may allow for easier adjustment in the event of limited funds. As regards air conditioning and heating systems the inspectors serve as independent experts giving advice.

In the case of buildings used as business premises, the persons employed therein need to be informed in order to use energy rationally and to be more receptive to the implementation of energy efficiency measures. This is fostered in the public sector through the appointment by the management of an employee as savings officer, i.e. the person responsible for promoting energy efficiency in the building in which he is employed. The Ministry of Energy, Commerce, Industry and Tourism provides savings officers with information and guidance, as well as information material for distribution among their colleagues. A similar measure is implemented in local authorities and private companies. The measure is expected to be further strengthened by the establishment of energy managers. Information measures at the workplace have a multiplying effect, as the knowledge obtained by employees is transferred to their dwellings, and they become information hubs in their environment.

4.5 Exemplary role of the public sector

In accordance with Article 5 of Directive 2012/27/EU on energy efficiency, each Member State shall ensure that, as of 1 January 2014, 3 % of the total floor area of the buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements. Member States may opt for an alternative approach to the requirement to have 3 % of the total floor area of the buildings owned and occupied by its central government renovated each year, whereby they take other cost-effective savings measures in selected privately-owned public buildings (including deep renovations and measures intended to improve user behaviour) to achieve, by 2020, an amount of energy savings that is at least equivalent. Cyprus has opted for the alternative approach, as it allows for more flexibility in implementing cost-optimal energy savings measures as appropriate. The measures planned for buildings used by the central government are recorded in a relevant report.

Energy upgrade works have started since 2013 in buildings owned and used by the central government under the 'ENERGEIN' project. The project included the major renovation of two buildings and the implementation of individual energy savings and renewable energy measures in another two buildings.

By virtue of the Decision of the Council of Ministers of 14 April 2016, a Committee was set up for upgrading the energy performance of buildings used by central government authorities, comprising representatives of the Department of Public Works, the Department of Electrical and Mechanical Services, the Directorate of Control of the Ministry of Transport, Communications and Works and the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism. The relevant working group has been appointed to schedule the energy savings measures based on the relevant technical data and the funds available. The working group also looks into the different financing methods. Financing of EUR 16 million has already been secured from the European and Structural Funds for the period 2014-2020 with a view to implementing energy upgrading projects in buildings owned and used by the central public administration. Also, the Department of Electrical and Mechanical Services has prepared standard energy performance contracting (EPC) forms for implementing energy savings measures in privately-owned public buildings. These forms can be adjusted in each case and are also expected to trigger the interest of energy service providers (ESPs). The committee should prepare an annual report to inform the Minister for Transport, Communications and Works and the Minister for Energy, Commerce, Industry and Tourism on the progress made in achieving the national target for energy savings in public buildings.

The Cypriot State acting as tenant of buildings has an opportunity to give an example by applying Article 6 of Directive 2012/27/EU on energy efficiency, as it has to rent only buildings that conform at least to the minimum energy performance requirements. If central government authorities decide to rent a non-high energy efficiency performance building, this must be justified by them in terms of cost-effectiveness, economic feasibility, wider sustainability and technical suitability.

Local authorities in Cyprus have taken the lead by stressing the role of local authorities in new technological challenges and environmental issues, such as addressing climate change and adapting to its impact. With support from the Cyprus Energy Agency, local authorities have endorsed the Covenant of Mayors or the Covenant of Islands, or have been accredited by the 'European Energy Prize'. The key obligations under these initiatives include the development of local sustainable energy action plans, with a view to reducing carbon dioxide emissions by more than 20 % by 2020. The action plans include, among other things, actions for improving the energy efficiency of buildings used by local authorities as well as actions for promoting measures relating to the energy upgrading of existing buildings or the construction of new ones with a high energy efficiency rating in the residential and tertiary sectors, to contribute towards energy savings. To date, 23 sustainable energy action plans have been prepared by the Cyprus Energy Agency and approved by the Secretariat of the Covenant of Mayors in Brussels for local authorities in Cyprus.

Several local authorities have expressed an interest in extending their action up until 2030, with more ambitious targets for reducing carbon dioxide emissions by more than 40 %. They are also ready to make a commitment for studying their vulnerability to the impact of climate change and implement measures for adapting to it. They are also joining forces with other insular local authorities in Europe, in support of the 'Smart Islands' initiative, which aims to stress the specificities of insular areas and mobilise targeted financing for RES, energy efficiency and sustainable transport projects on the islands.

A total of 23 sustainable energy action plans are estimated to ensure a reduction of approximately 600 000 tons of carbon dioxide (35 % lower emissions compared to 2009, i.e. the reference year), an increase in the amount of RES energy to 90 000 MWh/year, as well as energy savings of more than 2 000 000 MWh/year by 2020.

As a matter of fact, local authorities have difficulties in implementing, or securing funds for, actions intended for residential and tertiary sector buildings. This is due to their limited energy-related powers, as such issues are regulated mostly at a central government level. However, the municipalities and communities which have undertaken binding targets may adopt incentives and measures for significantly increasing mobilisation of energy investments within their boundaries, such as faster authorisation procedures, reduced real estate duties and taxes, or even setting up local energy upgrade support plans.

Consideration could also be given to setting up a feedback fund to support such investments, which could be funded from the savings resulting from the implementation of sustainable energy action plans, from grants, even from a fee imposed on the people living and undertakings operating in the municipality concerned. Naturally, each local authority should look into the measures in accordance with the financial, human and other resources at its disposal. The implementation of certain measures and incentives may also contradict the legislative framework on the functioning of local authorities, whereupon amendment to legislation or alternatives should be considered.

4.6 Breakdown of incentives for the energy upgrading of buildings rented or owned by several owners

As regards a certain percentage of the building stock, the parties involved are discouraged from making energy performance investments as all or part of the resulting benefits will not be enjoyed by the party bearing the initial investment costs. Buildings usually have this problem where (Economidou, Split incentive and energy efficiency in Cyprus, 2016):

I. The final energy user bears energy costs, but cannot decide to implement energy efficiency improvement measures, e.g. in rented dwellings and commercial premises.

II. The final energy user does not bear the energy costs, and therefore has no economic incentive to reduce consumption, e.g. hotel guests.

III. There are several owners or tenants and it is necessary to obtain consent from all of them to implement energy upgrading measures, e.g. in multi-apartment buildings.

IV. The building's uses and/or users keep changing either due to its type or due to its location, such as stores on commercial roads whose tenants change often or dwellings that are rented out on a temporary basis. In these cases, the duration of the use of the building is not long enough or is uncertain, thus not securing the pay-off of the initial capital expenditure.

Approximately 60 % of all dwellings in Cyprus may fall under one of the above cases or a combination thereof. The tenants and/or owners of apartments are a category representing a large percentage of the building stock and are very likely to face these challenges. This is mainly due to:

I. the different levels of understanding of the benefits of energy efficiency between joint owners;
II. the different incentives and priorities between joint owners;
III. the different levels of credit rating and income between joint owners;
IV. organisational issues associated with the collective decision-making process.

Rented dwellings represent 24 % of all dwellings. The implementation of energy upgrading measures in these dwellings may be prevented by the fact that the investment cost borne by the building owner results in benefits for the tenant alone. There is a similar problem with tertiary sector buildings. Despite the data from the commercial sector being insufficient, we do know that the renting of buildings as offices, points of sales of products and dining facilities constitutes a widespread practice in Cyprus.

Table 14: Ratio of dwellings that are used by their owners or are rented out (Economidou, Split incentive and energy efficiency in Cyprus, 2016)

	Used by owners	Rented out	Other
Single-family houses	35.9 %	6.9 %	2.9 %
Apartments, two-family houses, mixed use buildings	33.1 %	17.5 %	3.7 %
Other types of homes	0 %	0.1 %	0 %

The technical report entitled ‘Split incentives and energy efficiency in Cyprus’, as prepared by the JRC for the Ministry of Energy, Commerce, Industry and Tourism, provides an analysis of the roadblocks to the energy upgrading of buildings due to the current structure of the real estate market. To overcome the roadblocks, the technical report cites examples of successful policies and measures implemented in other countries, as well as proposals for measures that can be implemented in Cyprus. The most important measures proposed are:

(i) strengthening the application of the legislation on the issuance of energy performance certificates when buildings are rented;
(ii) fostering the installation of energy meters in each apartment;
(iii) fostering policies for simplifying the decision making process for buildings owned by several owners.

The 1st call issued in the context of the ‘Save & Upgrade’ programme attempted to give solutions to the obstacles that prevent the energy upgrading of buildings rented and those owned by several owners. Buildings that were rented could also be included in the plans. In the case of SMEs, the SME that was using the rented building or owned it and rented it out to another party was the applicant and beneficiary. In the case of dwellings, rented buildings could also be included, but the application could be filed only by the owner. Moreover, there was special provision made for including a multi-apartment building in the plan, whereby a management committee was the applicant and beneficiary of the grant. However, the number of such buildings in the ‘Save & Upgrade’ programme was limited.

In view of the above and with the involvement of the parties concerned, the incentives granted to owners of buildings that are rented and buildings owned by several owners, which are compatible with the social and financial situation in Cyprus, are reviewed.

4.7 Research in the field of the energy upgrading of existing buildings

Significant work has been carried out in recent years by universities and other research institutions in the field of the energy upgrading of existing buildings. The Energy Service of the Ministry of Energy, Commerce, Industry and Tourism supports such initiatives, mainly by issuing opinions on the policy implemented by the Republic of Cyprus in the energy sector, as well as on the dissemination of the results. Moreover, the results of these projects are also used as feedback to improve the existing arrangements and incentives relating to the energy upgrading of existing buildings. Following are some of these research projects, while we should also stress that other research programmes relating to the energy performance of buildings in general are being, or have been, implemented. Efforts to secure research programmes are still being made by stakeholder organisations, and additional research projects may be implemented by 2020.

The European research project ‘Energy Performance Indicator Tracking Schemes for the Continuous Optimization of Refurbishment Processes in European Housing Stocks’ (EPISCOPE) aims to consider the most effective methods for the energy upgrading of residential buildings, including scenarios for major renovation into NZEBs. Seventeen (17) Member States take part in the project, including Cyprus, its partner being the University of Cyprus.

The project ‘Nearly Zero-Energy Sports Facilities – n0e Sport Facilities’ aims to assess the current state of play in terms of energy in 18 sports facilities in the EU and to determine and implement innovative technological solutions for energy savings, aiming to save more than 50 % of the current energy consumption. As a result, the ‘n0e sport facilities’ project promotes the creation of nearly zero-energy sports facilities through the design and promotion of an integrated renovation package for sports facilities, including all the available energy savings methods/ measures and utilising renewable energy technologies. Three or four pilot sports facilities have been chosen in each country participating in the programme, to propose and implement energy efficiency improvement measures. The municipal swimming pool in Aglandjia, the sports facilities of the Chalkanoras Idaliou Club, the municipal swimming pool of Nicosia and the Sports Centre of Kition in Larnaca were chosen in Cyprus. The project is implemented in Cyprus by the Cyprus Energy Agency.

The Cyprus Institute is a partner in the QUALICHECK programme, aiming to review the credibility of the energy performance certificates issued and the quality of the construction works carried out. In nine countries, including Cyprus, there are certain issues reviewed and problems identified regarding the current procedures used to issue energy performance certificates and install such building elements as thermal insulation and passive cooling systems.

EUROFUND is a tool to be used to estimate the energy upgrading capacity of a building, just like a bank would assess the credit rating of a client. The tool will be based on a methodology to be developed on the basis of a number of energy performance parameters, such as the data included in the energy performance certificate, the number of available certified installers, the State grant schemes in force, etc. The programme is financed by the Horizon 2020 programme and is coordinated by the Cyprus University of Technology.

The Cyprus Energy Agency is a partner in the 'VIOLET' (preserVe traditiOnal buiLdings through Energy reducTion) project, which is co-financed by the ERDF and has a duration of 5 years (2017-2021). More specifically, the project aims to foster and develop policies for strengthening the energy performance of traditional buildings, also including parallel actions for reducing carbon dioxide emissions and preserving their cultural heritage. VIOLET encourages the application of integrated design for the energy upgrading and protection of traditional buildings, with a view to making sure that they are properly restored and preserved, as they will remain financially viable for ongoing use at reduced energy operating costs. There are 6 partners in the project, from Romania, Germany, Spain, the Netherlands, France and Cyprus, with a total budget of 1.3 million.

The project 'ENERJ - Joint Actions for energy efficiency' supports local authorities in implementing energy efficiency actions in public buildings, as measures taken in the context of their local energy and climatic policy. It fosters cooperation between local authorities concerning joint actions for energy savings. The ENERJ platform facilitates the planning of joint actions and hosts a database for local action plans concerning energy and energy savings measures. The project is co-financed by the ERDF through the Interreg MED programme and has a duration of 30 months (completion date: 31 April 2019). There are 10 partners in the project from Mediterranean countries. The Cypriot partner is the Cyprus Energy Agency.

5. Prospects for investment decisions of individuals, of the construction industry and of financial institutions.

The rate of renovations and the level of energy savings attained by each upgrading project will depend on the funds invested in this field in the following years. Investments in the renovation of buildings, leading also to reduced energy consumption, are often prevented by the fact that people tend to focus on the initial capital expenditure, ignore the benefits and focus also on the long pay-off periods. Providing investors with timely and substantiated information is necessary to enable them to make decisions for implementing cost-effective renovation projects. The topics of cost-effective approaches to renovation, provision of information and broader benefits are detailed in other parts of this document. However, even if these obstacles are overcome, financing is still the greatest roadblock in most cases. Following are the current and potential investors in the field of the renovation of buildings, as well as their challenges and prospects:

(i) Natural persons: The natural persons that use the buildings and have to pay the energy bills take a keen interest in reducing the amounts of energy they consume. The interest in savings is high in dwellings, where most of the occupants also own the buildings. The reduced income and the difficulty in obtaining loans, however, tend to prevent households from investing in energy savings measures. The financing difficulties faced by natural persons to date were mitigated to a certain extent by the grant schemes. Alternatively, the owners of small buildings can upgrade them gradually through small-scale targeted interventions that will reduce the initial capital expenditure and achieve short pay-off periods. For example, where the lifecycle of a technical system ends and the system is replaced by another one with a much higher energy efficiency rating, the additional cost consists only in the difference in cost between the more efficient system and the conventional one. Even in gradual upgrading, however, basic financial and technical planning is required to ensure the maximum possible return even on the limited funds invested. Therefore, the owner must always obtain advice from an independent expert. Where the natural person does not have to bear the energy costs, e.g. where he rents out the building, the investment must translate in an increase in the value of the property. Investing in the energy upgrading of a building, if accompanied by proper promotion when renting it out, may ensure economic benefits for the owner. This can be very effective in types of properties and in geographical areas with increased competition. It should also be stressed that an energy efficient building that is rented out ensures reduced energy costs for its tenant, allowing the latter to pay the rent more easily when in dire straits. Households and SMEs facing financial difficulties always choose to pay the electricity bill instead of the rent, as the electricity will be cut off immediately if the bill is not paid, whereas evicting a tenant is difficult.

(ii) Companies that own buildings: Buildings used as offices, hotels and private hospitals represent a significant asset for the company that owns them. By investing in energy savings measures, a company can significantly reduce its operating costs and increase its profit. A common reason why such investments are not realised is that they have to compete against other proposals in a company’s budget for investments that may ensure better return. To successfully implement energy savings investments, it is important to present sufficient and substantiated data to the company’s management. The process starts by gathering consumption data, which can be carried out by the organisation’s technical department, and/or by appointing certain staff members as energy officers, similar to the energy savings officers appointed by the public sector. The energy status then needs to be assessed, to identify where interventions can be implemented to reduce energy consumption. This can be done either by using the methods available on the market, such as an energy audit and the issuance of an energy performance certificate, or on an in-house basis if possible. This will result in a list of proposed investments, along with their return, to provide the company’s management with different options and enable them to set up a plan of energy interventions and savings. Investment in the energy upgrading of buildings can ensure added value to a company if integrated in its social corporate responsibility policy. Given the limited funds, companies have to choose what fields to invest in, just like the case is with other activities. Investing in the energy performance of a company’s building will be accompanied by a high energy efficiency rating in the energy performance certificate or a different energy and environmental certification, which will make the company stand out as being environmentally and socially responsible, while at the same time improving the economic viability of the company itself. Corporate social responsibility actions which also add value to the company last longer and are more likely to succeed, as they are implemented by the organisation’s executives more zealously and decisively.

(iii) Companies active in the building and energy sectors: Construction companies represent the major industry that will implement major renovations in buildings. This requires, however, cooperation from a number of other types of undertakings, such as vendors of building materials and technical elements, producers of building materials and companies engaging in the installation of technical and RES systems. These companies could, by the use of own funds or through easier access to financing, cover the initial capital expenditure themselves, said expenditure being repaid gradually. This will enable companies in the sector to attract customers more easily, as they will relieve them of the effort needed to secure financing and will establish a climate of mutual trust. As easy access to funds is often determined by the size of a company, if a number of companies in the sector pool together, this will make such access easier, while at the same time favouring the development of synergies and know-how. The legislative arrangements for ESPs and EPC, as well as the 'Save & Upgrade' programme aim to create a favourable business environment for partnerships of different types of companies that are involved in the renovation of buildings. ESPs cannot solve the problem of financing, but can make a contribution towards solving it, as there are different ESP models, financing being very important for some of them or totally unimportant for others. Cypriot undertakings can learn from ESPs that have been active in the EU for years or even consider establishing partnerships with them.

(iv) Concerning credit institutions: Financial institutions were seriously affected by the economic crisis, thus cutting down on lending, which had a really negative impact on the construction industry. On the other hand, the reduction in the number of new constructions leads to greater interest in renovations. Building renovations lead to a significant drop in operating costs due to reduced energy consumption and can represent reliable investment for financial institutions. Apart from the typical usual banking practice used, a bank that has to make a decision on whether to grant a loan for an investment may, for major renovation, use the results of the energy audit and the energy performance certificate for its assessment. There are financial institutions granting loans on favourable terms for individual energy savings and RES measures in buildings as well as major renovations. These products could be developed even more through partnerships with ESPs, energy auditors and other independent experts, to grant loans for cost-effective major renovations.

(v) Private investment funds: Using investment funds in the field of the renovation of buildings is a promising option. As of the end of 2015, there were 205 Cypriot investment service providers in Cyprus (Cyprus Securities and Exchange Commission). Despite the challenges faced by the economy, the interest in the setup of such undertakings is still vivid. Also, Cyprus has managed to make a reputation as a country that attracts foreign investment funds, thus having accumulated valuable experience in different professional sectors, such as the financial sector, the legal consulting and auditing-accounting sector, whereas the setup of infrastructures for attracting foreign investments, such as CIPA, has helped. Professional groups, undertakings and organisations focusing primarily on utilising private investment funds have started to engage in the hydrocarbon and RES sectors in recent years. The field of building renovation and energy upgrading is almost untouched by large investment funds, and the prospects of such investments must be looked into, as regards large buildings and groups of buildings in particular.

(vi) Public funds: Great effort has been made in recent years to reduce budgetary spending, thus leading to a lack of funds available for financing the energy upgrading of buildings. The energy savings measures implemented to date were financed by the Special Fund for RES and ES. Financing was strengthened by adding resources from the European Structural Funds for the period 2014-2020. Their contribution, however, is expected to be too small for the needs of an ambitious plan for the energy upgrading and major renovation of the existing building stock. Having such projects financed by public funds through large-scale grant schemes would require an increase in existing taxes (including the contribution to the Special Fund) and/or the imposition of new ones, which is not desirable under the current economic situation. The public sector as a source of financing in the following years is expected to settle for its exemplary role, implementing 3 % of the renovation of public buildings and using partnerships with the private sector.

5.1 Investment prospects up until 2030

In accordance with the baseline scenario referred to in par. 2.4 on the development of the building stock up until 2030 and on the basis of the assumption that the policies on new and existing dwellings will remain the same, an estimated approximate EUR 250 million will be spent on renovation works in the period 2015-2030.

Graph 19: Estimated costs to be incurred by 2030 for the renovation of dwellings - baseline scenario (Zangheri, 2016)

This amount can be doubled through a change to incentives, as referred to in par. 4.2 and in Graph 18. That is:

(i) A gradual transition to energy renovation lending mechanisms with a simultaneous restriction of grants only to vulnerable groups of people and exemplary energy projects.

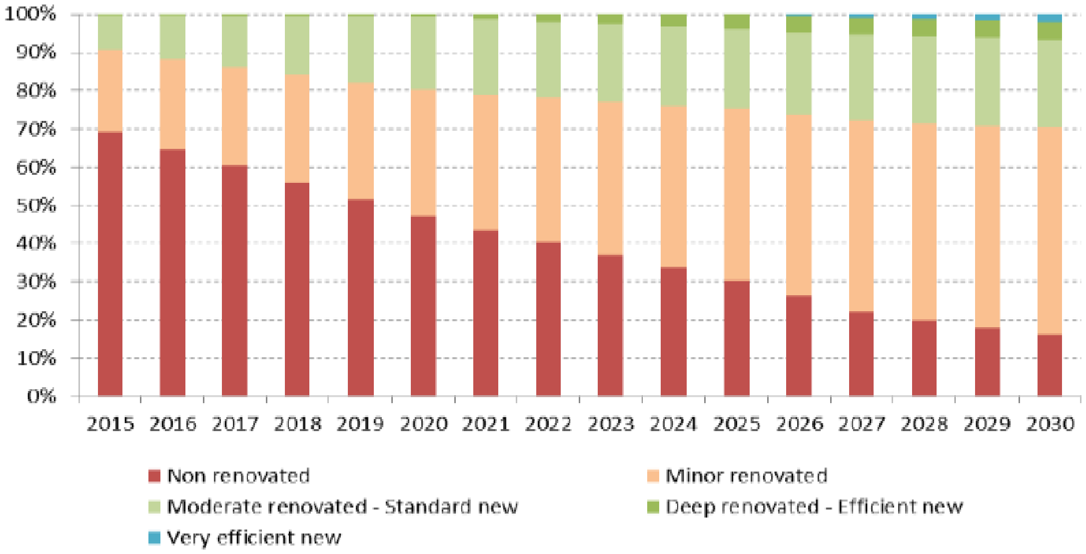
(ii) Training and/or certification of technical staff.

(iii) Systematic information provided to the public through information campaigns and one-stop shops providing energy renovation services to the public.

According to that scenario up until 2030, approximately 30 % of the dwellings will have a good energy efficiency rating, as opposed to 20 % under the baseline scenario.

Graph 20: Estimated costs to be incurred by 2030 for the renovation of dwellings - alternative scenario (Zangheri, 2016)

Graph 21: Estimated ratio of dwellings to be renovated by 2030 - alternative scenario (Zangheri, 2016)



6. Estimate of expected energy savings and broader benefits.

Renovating the existing building stock will undoubtedly lead to savings in energy and funds for the investor provided that it is implemented in a cost and technically optimal way. However, it is important to assess the benefit of renovation for society in general, e.g. for the competitiveness of the Cypriot economy, employment, social cohesion and the environment. The resulting benefits are dependent upon the quantity and quality of the renovation projects to be implemented in the following years. The relevant benefits are listed below, along with some estimates.

6.1 Economic benefits

In estimating the impact of implementing Directive 2012/27/EU on energy efficiency, the Commission predicted that achieving the energy savings targets would lead to an additional 2.7 % GDP increase by 2020, compared to the baseline scenario (BPIE, 2013). The effect of the energy upgrading of the existing building stock on the growth of the Cypriot economy has not been estimated, but certain estimates can be made of its positive impact on individual economic sectors.

The cost of fuels in 2015 stood at €1.1 billion, representing 22 % of the total imports of Cyprus (Ministry of Energy, Commerce, Industry and Tourism, 2015). Please note that the total value of Cypriot exports in the same year stood at EUR 1.7 billion. The cost of imported energy has been increasing over time, which is partly due to an increase in the global oil prices, but is primarily due to the fact that the economic growth and improvement of the standard of living in the last 40 years was based on increased energy intensity.

At a household level, the average energy expenditure for the functioning of a building is EUR 1 388 per year,, whereas the average family income is EUR 43 080, i.e. the annual energy costs represent almost a monthly salary in many cases (Statistical Service of the Ministry of Finance, 2009 Household Budget Survey, 2009). It is also foreseen that the costs incurred by households for energy products as a ratio of their income will keep increasing. An increase in the energy efficiency of buildings will release funds for households to purchase other services and products, which will have a multiplying benefit for the economy in general. As regards undertakings, a reduction in energy consumption will significantly improve their viability, which is particularly true for undertakings for which the energy costs of their building facilities represent a large part of the operating costs, e.g. hotels and retail stores. The positive impact of reduced energy consumption is expected to be higher, on a pro rata basis, for SMEs than for larger undertakings.

To achieve the energy upgrading of buildings, investments need to be made by the public, and primarily the private, sectors. To attain the renovation of an annual 3 % of the total floor area of buildings owned and operated by the central government, an estimated €18 million will be required in the period 2014-2020, while larger investments will be required for the energy upgrading of private buildings, as estimated in par. 5.1. Given that every EUR 1 million creates 19 jobs, these investments will lead to the creation of thousands of jobs across the production chain of the construction industry, which covers a wide range of occupations (European Commission, 2011).

6.2 Social benefits

Energy poverty is already a significant social problem that takes action to combat. One in seven households in the EU is at risk of poverty, and in Cyprus 59 369 households are designated as vulnerable consumers, 13 981 of which are granted special tariffs by the EAC. There are certain incentives already in place for vulnerable consumers (Chapter 4), but the mobilisation of investments in the renovation of dwellings leading to the energy upgrading of these dwellings will eliminate the problem for a number of decades.

Poor thermal comfort conditions in the existing building stock have a negative impact on the quality of life and, in some cases, on the health of the occupants. The World Health Organisation has recognised that the number of deaths caused by defective building design and construction in European countries is higher than the number of deaths caused by road accidents. The number of deaths in the winter is above average in Europe. According to the World Health Organisation, the increase in the number of deaths is linked to heavy winter conditions in each area. However, this link varies as the thermal insulation levels of buildings and their capacity to maintain high indoor temperatures play a major role. For example, the relevant increase in the number of deaths in winter is higher in the UK than in Scandinavian countries, where outdoor temperatures in winter are lower (World Health Organization - Europe, 2011). Also, one's home represents their social status. Inadequate and poor living conditions contribute towards social exclusion, and give rise to constant safety and health concerns. Such concerns affect mental health in the long run. The laws on energy efficiency have not addressed health and safety in buildings. However, the energy upgrading of existing buildings will unavoidably improve the quality of indoor areas, the living conditions and the quality of life.

6.3 Environmental benefits

Greenhouse emissions in Cyprus are almost entirely due to the consumption of energy (European Commission, 2015). Net of transport, those emissions rose by 61 % in 2011 compared to 1990. Consumption in buildings represents one third of the final energy consumption, thus having a significant share in the increase in greenhouse emissions. Only heating and air conditioning represent 6.9 % of all emissions. The energy upgrading of buildings will significantly reduce greenhouse emissions. For example, a home with a floor area of 195 m2 is responsible for the production of 9.7 tons of CO_2 annually, and an office building with a floor area of 1 448 m2 is responsible for the production of 135 tons of CO_2. By implementing measures reducing the consumption of energy by 56 %, CO_2 emissions can be reduced to 5.9 and 70 tons, respectively.

Reduced energy consumption in buildings, apart from its contribution towards combating climate change, also reduces the emissions of other polluting gases, such as SO_2, NOx and small particles produced by power plants and heating systems. These emissions have a negative impact on the environment and public health.

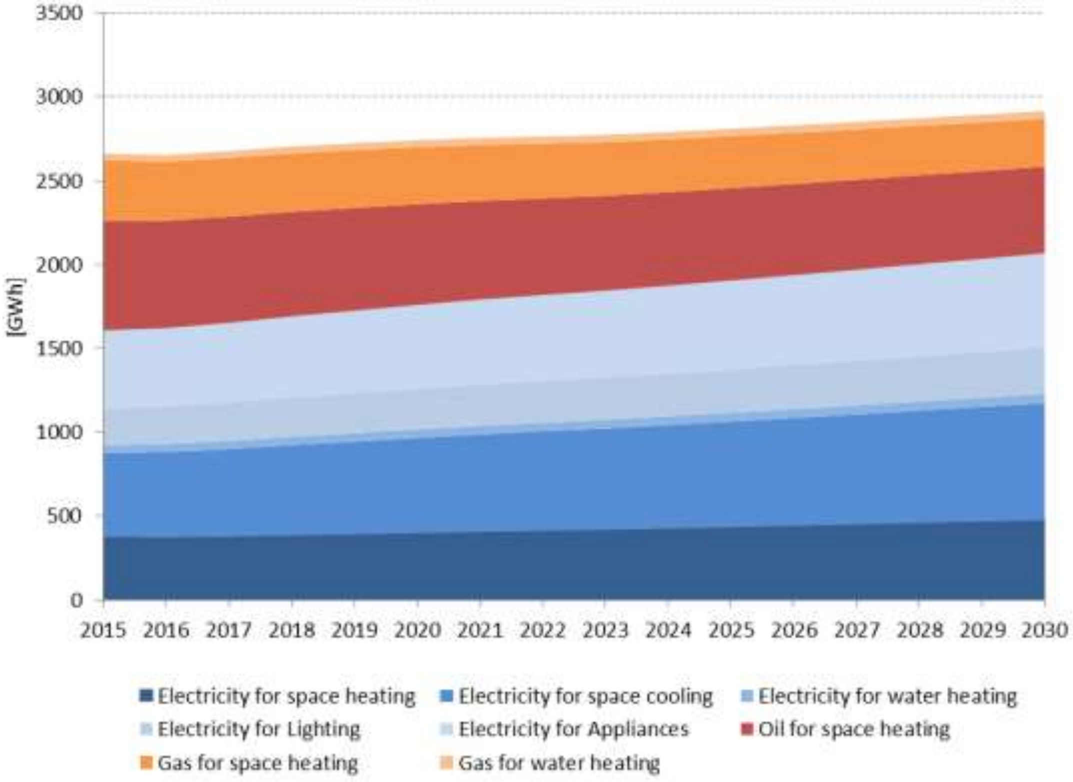
6.4 Benefits for the energy system of Cyprus

Cyprus has set an indicative target for improving its energy efficiency by 14.3% up until 2020, and based on Article 7 of Directive 2012/27/EU on energy efficiency, an estimated

240 000 TOE must be saved in the period 2014-2020, in addition to the savings resulting from applying the Directives on energy savings. Furthermore, Cyprus must ensure that the share of RES in final energy consumption is at least 13 % by 2020. Directive 2009/28/EC on the promotion of the use of energy from renewable sources states: ‘It will be incumbent upon Member States to make significant improvements in energy efficiency in all sectors in order more easily to achieve their targets for energy from renewable sources.’ Therefore, the energy upgrading of the existing building stock must be considered as necessary for attaining the above targets.

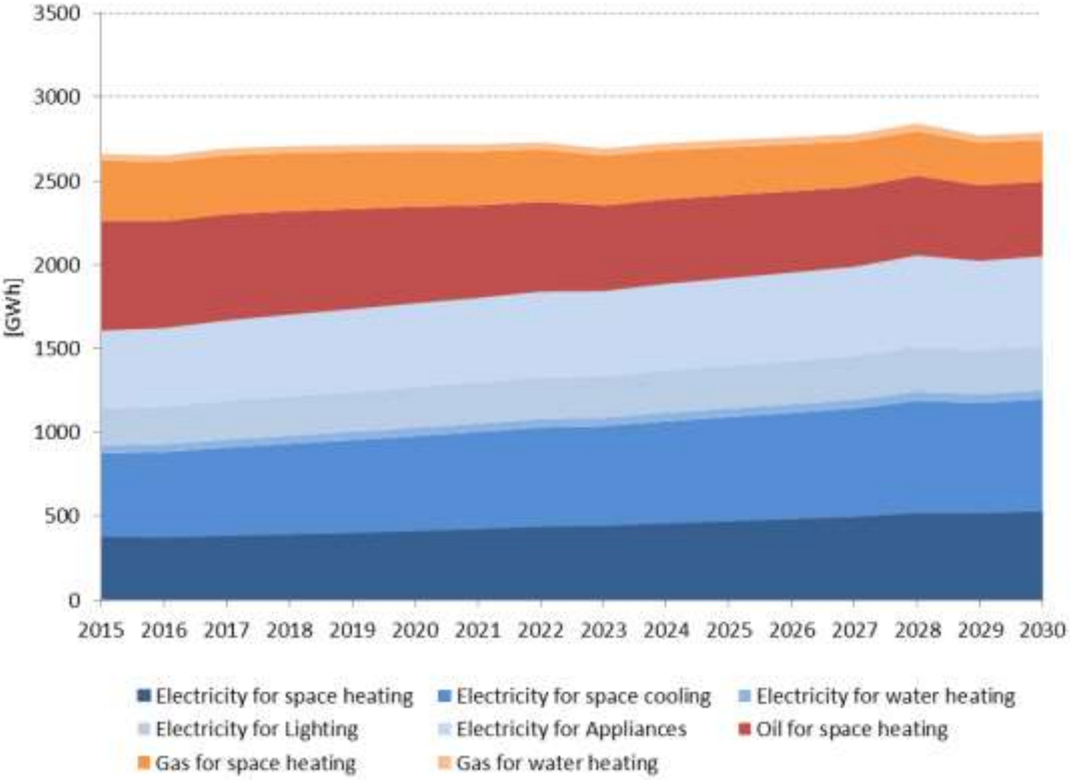
In accordance with the baseline scenario referred to in par. 2.4 and 5.1, continued implementation of the existing policies for dwellings is estimated to reduce the increase in the total final energy consumption (from non-renewable sources) by households to approximately 10 % in 2030 compared 2015 (Zangheri, 2016).

Graph 22: Estimated final energy consumption from conventional fuels in the residential sector by 2030 - baseline scenario (Zangheri, 2016).



This picture can be improved through a change to incentives, as described in par. 4.2 and 5.1. In accordance with that scenario, the final energy consumption in dwellings in 2030 will be approximately the same as total consumption in 2015 (Zangheri, 2016).

Graph 23: Estimated final energy consumption from conventional fuels in the residential sector by 2030 - alternative scenario (Zangheri, 2016).



The Commission has recognised that an increase in the rate of renovation of buildings, with a simultaneous enhancement of their energy efficiency, is very important in attaining the target of energy security. Increasing the energy efficiency of buildings will play a major role in increasing the security of energy supply to Cyprus as approximately 30 % of its final energy consumption is due to buildings. The increased dependence of Cyprus on imported fuels intensifies its dependence on external financial and political factors that are beyond its control.

Moreover, reducing energy consumption in buildings will mitigate the impact of the obligation to set up new power plants and to keep oil stocks. In Europe, it is estimated that attaining the target for a 20 % reduction in energy consumption by 2020 will result in avoiding the construction of 1 000 new conventional power plants and the setup of 500 000 wind turbines (BPIE, 2013). Electricity consumption in Cyprus has been increasing in the last ten years at an average annual rate of 6.6 %, thus necessitating the construction of new power generation and distribution infrastructures. In accordance with the Maintenance of Oil Stocks Laws, minimum stocks of crude oil and oil products must be maintained in Cyprus and/or other Member States. The Cyprus Organisation for Storage and Management of Oil Stocks (KODAP) maintained stocks worth EUR 111 million as of 2014, and the relevant storage and management costs stood at EUR 10 million (PWC, 2015). The construction of infrastructures for power generation and storage of oil products requires high capital expenditure, whereas the nature of these infrastructures is often incompatible with other economic activities, such as tourism, as the land available for development is limited.

7. Conclusions

The renovation of the existing building stock and the upgrading of its energy efficiency is one of the most important tools for Cyprus to comply with its obligations in the energy sector and reduce greenhouse emissions. The need for increasing the number of renovation projects is getting more imperative given the benefits that can be derived for building owners, undertakings, public finances and the labour market.

The field of energy interventions in buildings has grown in recent years. Such growth, however, is lower than the field's potential. Speeding up the rate of renovations and ensuring better enhancement of the energy efficiency of a building following renovation is subject to roadblocks relating primarily to financing and the provision of information. Adopting new statutory measures and incentives and revising existing ones is a way to remove the roadblocks, which is not sufficient though. The reaction of the parties involved in the private sector and their capacity to take advantage of the challenges to emerge in the following years can play a major role.

The drawing up of this publication, which first took place in 2014, and its revision, which resulted in this version, has given an opportunity to discuss and analyse, as far as feasible, the problems faced by each professional sector involved in the energy upgrading of buildings. However, the 'Strategy for mobilising investment in the field of building renovation' should not be seen as a mere recording of the problems and potential of renovations, but as a first step and springboard for helping building owners, investors and professionals in the sector to join forces in an effort that will ensure maximum economic and other benefits for all the parties concerned.

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ANNEX G: ENERGY SAVINGS PER SECTOR IN FINAL AND PRIMARY CONSUMPTION

Residential sector

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	NUMBER OF INVESTMENTS / QUANTITY	GRANT / PURCHASE AMOUNT	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
					TOE	%	TOE	TOE	%
1	**Minimum energy performance requirements for new buildings (Law 142/2006)**	2008-2016	-	EUR -	**97 275.2**	**52.58 %**	**67 696.9**	**67 696.9**	**18.05 %**
2	**Energy savings grant scheme in the residential sector (existing dwellings)**	2004-2013	27 930	**EUR 33 882 837**	**10 526.7**	**5.69 %**	**1 093.9**	**1 093.9**	**0.29 %**
2.1	Thermal insulation of walls	2004-2013	2 224	EUR 33 882 837	861.3	0.47 %	13.6	13.6	0.00 %
2.2	Thermal insulation of windows	2004-2013	22 074		5 081.7	2.75 %	40.6	40.6	0.01 %
2.3	Thermal insulation of roofs	2004-2013	3 632		4 583.6	2.48 %	1 039.7	1 039.7	0.28 %
3	**Distribution of fluorescent lamps free of charge**	2007-2010	2 001 748	**EUR 2 710 840**	**13 696.3**	**7.40 %**	**13 696.3**	**9 767.5**	**2.60 %**
4	**RES grant scheme (end use) in the residential sector**	2004-2013	42 922	**EUR 20 694 929**	**12 734.4**	**6.88 %**	**987.2**	**987.2**	**0.26 %**
4.1	Autonomous photovoltaic systems	2004-2013	379	EUR 1 530 037	117.3	0.06 %	51.6	51.6	**0.01 %**
4.2	Household solar systems	2004-2013	41 521	EUR 10 191 538	11 614.7	6.28 %	554.7	554.7	**0.15 %**
4.3	Solar space heating/cooling	2004-2013	813	EUR 7 320 710	661.1	0.36 %	284.7	284.7	**0.08 %**
4.4	Central active solar water heating systems	2004-2013	48	EUR 182 203	52.1	0.03 %	15.5	15.5	**0.00 %**
4.5	Solar swimming pool water heating systems.	2004-2008	51	EUR 166 981	40.6	0.02 %	0.0	-	**0.00 %**
4.6	Heat pump with ground heat exchanger for space heating and cooling	2004-2011	110	EUR 1 303 460	248.6	0.13 %	80.7	80.7	**0.02 %**
5	**Scheme for installing PV systems using the NET METERING method in the residential sector.**	**2013-2016**	**91.35**	**EUR 5 625 329**	**10 495.4**	**5.67 %**	**10 495.4**	**10 495.4**	**2.80 %**
6	**'Save & Upgrade' grant scheme for dwellings**	**2015-2016**	**651**	**EUR 6 800 209**	**2 824.1**	**1.53 %**	**2 824.1**	**2 824.1**	**0.75 %**
6.1	**'Save & Upgrade' grant scheme for dwellings (vulnerable people - individual measures)**	**2015-2016**	**48**	**EUR 92 561**	**33.1**	**0.02 %**	**33.1**	**33.1**	**0.01 %**
7	**Solar water heater replacement scheme**	**2015-2016**	**579**	**EUR 177 550**	**98.3**	**0.05 %**	**98.3**	**98.3**	**0.03 %**
8	**Horizontal measures (information campaigns, workshops, etc.) to attain the target referred to in Article 7 of the Directive.**	**2014-2015**	**0**	**EUR -**	**614.2**	**0.33 %**	**614.2**	**-**	**0.00 %**
TOTAL				**EUR 69 984 255**	**148 298**	**80.16 %**	**97 539.4**	**92 996.4**	**24.80 %**

Tertiary sector

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	NUMBER OF INVESTMENTS	GRANT / PURCHASE AMOUNT	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
					TOE	%	TOE	TOE	%
1	**National Green Public Procurement Action Plan - public and broader public sector**	**2007-2015**	**67 441**	**EUR 12 392 258**	**515.6**	**0.28 %**	**368.9**	**368.9**	**0.10 %**
1.1	Fluorescent tubes in the public sector	2007-2013	22 856	EUR 29 068	0.0	0.00 %	0.0	0.0	0.00 %
1.2	Installation of air conditioners in the public sector	2007-2015	2 131	EUR 890 742	148.0	0.08 %	100.3	100.3	0.03 %
1.3	Replacement of air conditioners in the public sector	2007-2015	1 641	EUR 707 761	148.5	0.08 %	97.6	97.6	0.03 %
1.4	Installation / replacement of VRV HEAT PUMP CHILLERS in the public sector	2010-2015	40	EUR 663 334	202.2	0.11 %	154.2	154.2	0.04 %
1.5	Replacement of computers in the public sector	2007-2013	19 918	EUR 8 420 399	0.0	0.00 %	0.0	0.0	0.00 %
1.6	Replacement of monitors in the public sector	2007-2013	20 846	EUR 1 596 776	0.0	0.00 %	0.0	0.0	0.00 %
1.7	Replacement of boilers in the public sector	2010-2013	9	EUR 84 178	16.9	0.01 %	16.9	16.9	0.00 %
2	**Energy savings / RES grant scheme for the public and broader public sector**	**2004-2013**	**3**	**EUR 37 908**	**96.6**	**0.05 %**	**0.0**	**0.0**	**0.00 %**
2.1	Energy savings grant scheme for the public and broader public sector	2004-2013	3	EUR 37 908	110.2	0.06 %	0.0	0.0	0.00 %
3	**Minimum energy performance requirements for new tertiary sector buildings (Law 142/2006)**	**2008-2016**	-	EUR -	**11 152.3**	**6.03 %**	**9 024.7**	**9 024.7**	**2.41 %**
4	**Energy savings grant scheme (end use) in the tertiary sector (existing buildings)**	**2004-2013**	**371**	**EUR 4 384 647**	**9 042.5**	**4.89 %**	**715.1**	**715.1**	**0.19 %**
5	**RES grant scheme (end use) in the tertiary sector / undertakings**	**2004-2013**	**160**	**EUR 2 347 289**	**1 133.4**	**0.61%**	**84.5**	**84.5**	**0.02 %**
5.1	Autonomous photovoltaic systems	2004-2013	11	EUR 56 704	6.2	0.00 %	2.1	2.1	0.00 %
5.2	Solar space heating/cooling	2004-2013	26	EUR 507 460	76.7	0.04 %	19.5	19.5	0.01 %
5.3	Central active solar water heating systems	2004-2013	111	EUR 811 604	352.6	0.19 %	62.9	62.9	0.02 %
5.4	Solar swimming pool water heating systems.	2004-2008	9	EUR 56 049	32.4	0.02 %	0.0	0.0	0.00 %
5.5	Heat pump with ground heat exchanger for space heating and cooling	2004-2011	3	EUR 915 472	665.4	0.36 %	0.0	0.0	0.00 %
6	**Installation of photovoltaic systems for autoproduction by business consumers**	**2013-2015**	**47**	**EUR -**	**717.2**	**0.39 %**	**717.2**	**717.2**	**0.19 %**

7	**‘Save & Upgrade’ scheme for enterprises**	**2015-2016**	**119**	**EUR 8 980 267**	**4 722.9**	**2.55 %**	**4 722.9**	**4 722.9**	**1.26 %**
8	**Measures aimed at attaining the target referred to in Article 5 of the Directive**	**2014-2016**	**0**	**EUR -**	**345.8**	**0.19 %**	**345.8**	**132.8**	**0.04 %**
8.1	Energy savings from major renovation and individual energy savings measures.		0	EUR -	132.8	0.07 %	132.8	132.8	0.04 %
8.2	Energy savings from measures intended to improve user behaviour with a view to a more rational use of energy in public buildings.		0	EUR -	213.0	0.12 %	213.0	0.0	0.00 %
9	**Horizontal measures (information campaigns, workshops, etc.) to attain the target referred to in Article 7 of the Directive.**	**2014-2015**	**0**	**EUR -**	**51.4**	**0.03 %**	**51.4**	**0.0**	**0.00 %**
TOTAL				EUR 28 142 369	27 777.4	15.01 %	16 030.5	15 766.1	4.20 %

Industry sector

No	**DESCRIPTION OF MEASURES**	**IMPLEMENTATION PERIOD**	**NUMBER OF INVESTMENTS**	**GRANT / PURCHASE AMOUNT**	**CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)**		**PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016**	**CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)**	
					TOE	%	**TOE**	**TOE**	**%**
1	**Energy savings grant scheme (in existing undertakings)**	**2004-2013**	**86**	**EUR 1 537 659**	**2 409.8**	**1.30 %**	**604.9**	**604.9**	**0.16 %**
2	**Grant scheme encouraging the use of RES (end use) in the industry sector and in agriculture 2004-2013.**	**2004-2013**	**54**	**EUR 230 243**	**29.1**	**0.02 %**	**5.6**	**5.6**	**0.00 %**
2.1	Solar space heating/cooling	2004-2013	1	EUR 49 280	9.5	0.01 %	0.0	0.0	0.00 %
2.2	Central active solar water heating systems	2004-2013	6	EUR 13 779	5.5	0.00 %	0.0	0.0	0.00 %
2.3	Autonomous photovoltaic systems - lighting	2004-2013	11.00	EUR 11 472	1.4	0.00 %	1.4	1.4	0.00 %
2.4	Autonomous photovoltaic systems (agriculture)	2004-2013	36	EUR 155 712	12.5	0.01 %	4.2	4.2	0.00 %
3	**Horizontal measures (information campaigns, workshops, etc.) to attain the target referred to in Article 7 of the Directive.**	**2014-2015**	**0**	**EUR -**	**2.6**	**0.00 %**	**2.6**	**0.0**	**0.00 %**
TOTAL				EUR 1 767 902	2 441.5	1.32 %	613.2	610.6	0.16 %

Transport sector

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	NUMBER OF INVESTMENTS	GRANT / PURCHASE AMOUNT	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
					TOE	%	TOE	TOE	%
1	**Energy savings grant scheme in transport (purchasing hybrid, electric and low-pollutant vehicles) 2004-2009.**	2006-2009	3 092.00	EUR 2 611 923	1 073.5	0.58 %	0.0	0.0	**0.00 %**
1.1	Hybrid vehicles	2006-2009	831	EUR 997 338	352.8	0.19 %	0.0	0.0	**0.00 %**
1.2	Electric vehicles	2006-2009	32	EUR 22 566	19.9	0.01 %	0.0	0.0	**0.00 %**
1.3	Vehicles with carbon dioxide emissions levels lower than 120 g/Km	2006-2009	2 229	EUR 1 592 019	700.8	0.38 %	0.0	0.0	**0.00 %**
2	**Vehicle Scrapping Scheme.**	2008-2011	4 072	EUR 5 785 055	2 822.8	1.53 %	167.0	167.0	**0.04 %**
3	**Action plan for transport**	2007-2016	-	-	45 266.1	24.47 %	63 759.2	-	-
TOTAL				EUR 8 396 978	49 162.3	26.57 %	63 926.2	167.0	0.04 %

OTHER MEASURES

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	NUMBER OF INVESTMENTS	GRANT / PURCHASE AMOUNT	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
					TOE	%	TOE	TOE	%
1	**REPLACEMENT OF ENERGY-RELATED PRODUCTS (DIRECTIVE 2010/30/EC ON THE INDICATION BY LABELLING AND STANDARD PRODUCT INFORMATION OF ENERGY AND OTHER RESOURCES BY ENERGY-RELATED PRODUCTS).**	2010-2015	0.00	0.00	12 802.3	6.92 %	12 802.3	12 275.2	**3.27 %**
TOTAL FOR ALL SECTORS					12 802.3	6.92 %	12 802.3	12 275.2	3.27 %

TOTAL FOR ALL SECTORS

No	DESCRIPTION OF MEASURES	IMPLEMENTATION PERIOD	NUMBER OF INVESTMENTS	GRANT / PURCHASE AMOUNT	CONTRIBUTION TOWARDS THE INDICATIVE END USE TARGET (2016, 185 000 toe)		PRIMARY ENERGY CONSUMPTION SAVINGS IN 2016	CONTRIBUTION TOWARDS THE INDICATIVE PRIMARY CONSUMPTION TARGET (2020, 375 000 toe)	
					TOE	%	TOE	TOE	%
TOTAL FOR ALL SECTORS				EUR 108 291 505	240 481.2	130 %	190 911.6	121 815.31	32.48 %

ANNEX H: UPDATE OF NATIONAL ENERGY FORECASTS FOR THE REPUBLIC OF CYPRUS

UPDATE OF NATIONAL ENERGY FORECASTS FOR THE REPUBLIC OF CYPRUS, TO BE USED IN THE 4TH NATIONAL ENERGY EFFICIENCY ACTION PLAN

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May 2017

1. Introduction

This note presents an update of the national energy forecasts for the Republic of Cyprus that were carried out with the latest version of the 3EP/CUT energy forecast model. These forecasts are intended to be used by national authorities in the submission of the updated National Energy Efficiency Action Plan to the European Commission.

Since the last submission of these Action Plans in year 2014, both the macroeconomic environment of Cyprus and the EU-wide regulatory environment in energy issues have changed considerably. In the macroeconomic front, after the dramatic events of March 2013 and the requirements for fiscal adjustment as well as downsizing and restructuring of the domestic banking sector in order to attain sustainable levels of public debt in the medium term, an economic and financial adjustment programme for Cyprus was agreed between the national authorities and the Troika (European Commission, European Central Bank and International Monetary Fund). The adjustment programme assumed a strong contraction of the national economy in years 2013-2014 – mainly due to significant decreases in private and public consumption as well as fixed investment – and a slow rebound of economic growth from 2015 onwards. This macroeconomic outlook, which had been incorporated in the revised NEEAP of 2014, turned out to be too pessimistic since the economy of Cyprus experienced a slower-than-predicted economic recession and a faster recovery. The current NEEAP update takes into account the revised economic outlook which leads to higher growth rates in the future.

As far as the regulatory environment is concerned, following the EU's "Energy Efficiency Directive" (2012/27/EU), a number of policies and measures have been implemented for energy-efficiency- oriented renovations in the existing building stock – with specific obligations for governmental buildings – and for specific energy savings to be attained by energy distributors or retail energy sales companies. Moreover, some national initiatives have materialised in recent years, mainly focusing on grants for energy renovations in residential and commercial buildings.

The national energy forecast model that was used for the 4th NEEAP calculates future annual energy consumption in each major economic sector of Cyprus (agriculture, cement industry, other industry, households, services, road passenger transport, road freight transport and air transport) as a function of future macroeconomic variables and future energy prices. Simultaneously it calculates fuel shares in each sector, depending on technology costs (investment, operation, maintenance and fuel costs), the penetration potential of various technologies and technical constraints for the uptake of new technologies, and allows computing future final energy consumption by sector and fuel.

2. Macroeconomic and oil price assumptions

Table 1 presents the basic macroeconomic assumptions up to the year 2020 that have been used in this study. Economic output declined substantially in 2013 and less in 2014, but started growing again in 2015. Aggregate indicators, i.e. GDP and private consumption for 2017-2018 are in line with the European Commission's macroeconomic forecasts[11]; for subsequent years national growth forecasts were used, as provided to us by the Finance Ministry of Cyprus in November 2016. According to the projections of the Cypriot Ministry of Finance, the economy of Cyprus is assumed to follow a path of sustained growth, with real GDP growth rates of 2.7-2.8% per year up to 2020. Private consumption is assumed to grow at a slower pace than GDP in the short and medium term because it has been hit less by the economic downturn of recent years and has remained at relatively higher than expected levels.

The contribution of each major economic sector to GDP is assumed to remain essentially constant. The GDP share of industry, which was around 13% in the mid-1990s, fell to 10% in 2005 and to 7% in 2014- 15, is assumed to rebound slightly – to 7.6% by 2020 and to higher shares in the coming decades. A stronger rebound is expected in the construction sector, whose share plunged from 11% to just over 4% during the years of the financial crisis, and is assumed to revert to 5.6% in 2020 with an increasing long- term trend. The contribution of agriculture, around 2% today, is assumed to remain at the same level up to 2020. Finally, the tertiary sector is assumed to keep its dominant role in the economy and continue contributing by more than 80% to national economic output.

The energy system of Cyprus is almost entirely dependent on oil products, hence retail fuel prices – in the absence of changes on energy taxes – will change in the future in line with the evolution of international crude oil prices. The latter are assumed to develop in line with the central scenario ("New Policies Scenario") of the International Energy Agency's World Energy Outlook 2016, which was published in November 2016[12]. According to the IEA's forecast, crude oil price is expected to rebound from its current quite low levels of $40-50 per barrel, and reach $79 per barrel in 2020 (at constant prices of year 2015), with a further increasing trend in later years. We assumed for the entire forecast period that the exchange rate between the euro and the US dollar will remain constant at 1.11 USD/EUR, which is the average exchange rate of year 2015 according to Eurostat.

3. Energy efficiency scenarios

To simulate the effect of energy efficiency measures on national energy consumption, the two available scenarios from earlier national Action Plans ('reference' and 'additional energy efficiency' scenario respectively) have been updated. The two scenarios contain different

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[11] European Commission, *European Economic Forecast – Autumn 2016*. Institutional Paper 038, Brussels, November 2016, ISSN: 2443-8014. https://ec.europa.eu/info/publications/economy-finance/european-economic-forecast-autumn- 2016_en

[12] International Energy Agency, *World Energy Outlook 2016*. Paris, France, ISBN: 978-92-64-26495-3. http://www.worldenergyoutlook.org/publications/weo-2016/

assumptions with regard to the implementation of energy efficiency measures in the various sectors of the Cypriot economy. Such measures include:

- Actions taken as a result of mandatory compliance with EU legislation, such as the 'Energy Services Directive' (2006/32/EC), the Directive on labelling and standard product information of the energy consumption by energy-related products (2010/30/EC), the Directive on energy performance of buildings (2010/31/EC), and the recent Energy Efficiency Directive (2012/27/EU); and

- Additional national measures such as subsidies for energy efficiency and renewable energy investments by households and firms.

More specifically:

- The Reference Scenario assumes that no additional measures – at EU and national level – are implemented after 2010. In other words, Directives adopted in year 2010 (the Energy Labelling Directive 2010/30/EC and the Energy Buildings Directive 2010/31/EC) and national subsidies up to the year 2010 are assumed to take effect, but no post-2010 actions are included. It has to be noted that this scenario is not identical with the corresponding 'reference scenarios' that were used in the 2nd and 3rd NEEAPs of Cyprus (in 2011 and 2014 respectively) because this scenario incorporates the latest macroeconomic developments described in Section 2 of this note.

- The Additional Energy Efficiency Scenario assumes that further energy efficiency measures are adopted in the post-2010 period, such as a continuation of national subsidies for investments in energy saving technologies, the implementation of the 'Energy Efficiency Directive' at EU level, and some modest adoption of further legislation on near-zero energy buildings later in this decade. More specifically, implementing the Energy Efficiency Directive 2012/27/EU leads to the following measures up to 2020:

  - Renovations and other measures of upgrading energy efficiency in buildings owned and used by the central government.
  - Implementation of measures for the achievement of the obligatory target for energy savings at end use level by 2020, as set by article 7 of the Directive (including, amongst others, the continuation up to 2020 of financial incentives for renovating household and buildings owned and used by SMEs).
  - Energy efficiency requirements on purchasing by public bodies
  - Energy efficiency measures in street lighting
  - Obligation for energy audits for non-SMEs
  - Energy efficiency information and education measures.

  As far as the industrial sector is concerned, there has been limited attention to improving the energy efficiency of industrial processes or equipment in Cyprus in recent years. The policies taken into account in the Additional Energy Efficiency Scenario for this sector are those foreseen in the Energy Efficiency Directive (2012/27/EU) as well as training of engineers and energy managers of industrial plants. Furthermore, some modest industrial investments in automations or replacement of electric motors or compressed-air systems with more energy efficient ones are assumed.

As regards transport, the Additional Energy Efficiency Scenario assumes a continuation of the same trends on transport activity and modal split, but additional roadside inspections for passenger cars and trucks which can lead to some small improvements in the fuel economy of on-road motor vehicles. Moreover, a strengthening of national CO2-based vehicle taxation is also assumed to take place in 2019, which can somewhat accelerate the adoption of new low-carbon cars in the vehicle stock. Available information from national transport authorities was used in order to arrive at these assumptions.

Final electricity demand in the ‘additional energy efficiency scenario’ was calibrated so as to be in line with the latest official electricity forecast for the period 2016-2025 that was prepared by the Transmission System Operator (TSO) and approved by the Cyprus Regulatory Authority for Energy in 2016. The latest projection available during the model runs of this study was published in March 2016[13] but more recent data were also provided by the TSO. As this forecast is about electricity generation and not final consumption, it is necessary to know the TSO’s assumptions about auto-consumption of power plants and the assumptions of the Electricity Authority of Cyprus (EAC) about transmission & distribution losses. The study group, with the aid of the Ministry of Energy, Commerce, Industry and Tourism (MECIT), obtained such information from the TSO. Sectoral shares of electricity demand have also taken into account preliminary results from the preparation of the revised National Renewable Energy Action Plan that is currently conducted by MECIT for the period up to 2020[14].

New infrastructure projects that may affect energy consumption in Cyprus (such as marinas, casino resort, desalination plants etc.) are implicitly assumed to affect future energy demand to the extent that they will affect economic growth as well. No special provisions were made for them in the scenarios presented in this note. It should be kept in mind that the same approach is followed by the national TSO in its long-term electricity forecast.

As regards the fuel shares in each end-use sector, for both scenarios described above, the energy model calculates with dynamic recursive equations – for each future year – the allocation of final energy demand among different fuels. For this purpose, the uptake of different technologies/fuels by sector is simulated, based on each technology’s costs as well as on the technically exploitable potential of each technological option. For this purpose, detailed technical information was obtained from the Cyprus Energy Service and the Cyprus Institute of Energy on the basis of earlier specialised sectoral studies and data collected in the frame of national grant schemes for investments in energy efficient and renewable energy technologies. In principle it was assumed that no drastic changes in the fuel mix of final energy consumption will take place until 2020, apart from some shifts towards

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[13] See http://www.dsm.org.cy/nqcontent.cfm?a_id=2990&tt=graphic&lang=l2

[14] Taliotis K., Howells M., Partasides G. and Gardumi F. (2017), Cost-optimal scenario analysis for the Cypriot energy system. Unpublished report conducted under grant VC/2015/0004 of the European Commission, Report DESA/17/4, royal Institute of Technology, Stockholm, Sweden.

renewable energy forms (including biomass and biofuels) to ensure compliance with related EU legislation.

The two scenarios were implemented as follows:

- For the Reference Scenario, we followed the same trend in energy intensity that was foreseen in the Reference Scenario of the previous (3rd) NEEAP and adapted the evolution of energy consumption up to 2020 in line with the most recent actual energy consumption data and the latest economic growth forecasts up to 2020. This is a reasonable approach as the NEEAP Reference Scenario is by definition a counterfactual scenario that cannot be implemented today, because it assumes that there were no new energy efficiency policies adopted after 2010. On the other hand, this approach ensures a meaningful comparison between this and the Additional Energy Efficiency Scenario.

  This approach, however, was not straightforward because, apart from economic growth forecasts that changed between the time of the previous NEEAP and today, there has also been a revision of official national GDP figures of the past. We therefore constructed an energy intensity index, and made sure that the harmonised Reference Scenario follows the same relative evolution in energy intensity with that of the 3rd NEEAP's Reference Scenario.

- The Additional Energy Efficiency Scenario was derived from a recent study conducted for MECIT by GIZ and 3EP/CUT, which was funded by the European Commission and the German Ministry for Economy and Energy.[15] The third scenario of that study, which was designated as 'realistic scenario', was designed in agreement with MECIT, in order to comply with the requirements for the Additional Energy Efficiency Scenario of this NEEAP. It contains the assumptions about energy policies by sector which were described in the previous paragraphs. In the frame of this project a separate detailed study was conducted for the transport sector of Cyprus[16]; results of that study have been incorporated in our forecasts as well.

4. Power Generation

The electricity sector is not modelled explicitly by our energy model in its current form; however, the model's projections for final electricity demand by sector and scenario are combined with those of studies conducted by MECIT for the power generation sector, and fuel inputs for power generation are then calculated on the basis of appropriate assumptions. More specifically, electricity demand forecasts of our model have been fed into OSEMOSYS (Open Source Energy Modelling System), a cost optimization tool used for long-term energy planning, which is currently used by MECIT and KTH (the Swedish Royal Institute of Technology) for a quantitative analysis of the Cypriot energy system.

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[15] Vougiouklakis Y., Struss B., Zachariadis T. and Michopoulos A. (2017), A draft energy efficiency strategy for Cyprus up to 2020, 2030 and 2050. Deliverable 1.1. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, May 2017. Project funded by the European Commission Structural Reform Support Service under grant agreement SRSS/S2016/002 and by the German Federal Ministry of Economy and Energy.

[16] Heidt C., Jamet M., Lambrecht U., Bergk F. and Allekotte M. (2017), Penetration of alternative fuels in Cyprus road and maritime sectors. ifeu – Institut für Energie- und Umweltforschung Heidelberg. Project funded by the European Commission Structural Reform Support Service under grant agreement SRSS/S2016/002 and by the German Federal Ministry of Economy and Energy.

As regards fuel inputs in power generation, in line with the definition of the two scenarios in previous versions of the NEEAP, the Reference Scenario assumes that natural gas will not penetrate in power generation of the country until 2020, whereas the Additional Energy Efficiency Scenario was calculated by assuming that natural gas will enter the market in 2019, as foreseen by national authorities in early 2017.

Thermal efficiency of power generation in the case with natural gas was calculated on the basis of earlier official forecasts of the Cyprus Energy Regulatory Authority. Overall thermal efficiency of non- renewable power plants is forecast to increase considerably thanks to the introduction of natural gas from 2016 onwards. Most of the power generation in year 2020 will take place in natural gas fired combined cycle gas turbine (CCGT) power plants. A considerable fraction of electricity will be produced by renewable energy sources, and only a tiny fraction of fuel oil and diesel oil will be used.

For the case of no natural gas penetration (i.e. in the Reference Scenario), it was assumed that the thermal efficiency of non-renewable power plants will improve slightly over the years. This may happen because all newly built power plants in Cyprus use the CCGT technology. Even though their utilisation will not be as high as in the case of natural gas (because in the absence of natural gas they have to operate with more expensive diesel oil and plant operators will prefer to use cheaper fuel oil burning power plants more intensively than CCGT plants), and despite a somewhat lower thermal efficiency of these plants when they operate on diesel oil instead of natural gas, still they will improve the average thermal efficiency to some extent, so that a gradual increase of average efficiency up to 40% in 2020 seems to be justified.

5. Results

Table 2 shows the procedure followed in order to adapt the previous Reference Scenario forecast to both the actual national energy data up to 2015 and the revised macroeconomic forecast up to 2020 as explained above. Table 3 presents the energy demand forecasts up to the year 2020 according to the Reference Scenario and the Additional Energy Efficiency Scenario, separately for the economic sectors falling under the 'heating and cooling' category (households, cement industry, rest of industry, services and agriculture) and for the transport sectors (road passenger, road freight and air transport). In the lower part, Table 3 presents the resulting energy savings that are used in the updated (4th) National Energy Efficiency Action Plan of Cyprus.

When comparing these projections with the forecast of the 3rd NEEAP (submitted in 2014), two points stand out. First, it turns out that Cyprus might attain slightly higher energy savings than those foreseen in the 3rd NEEAP, both in absolute and in relative terms. The current forecast leads to savings in national energy consumption of 397 ktoe in 2020, or 15% compared to the Reference Scenario. In contrast, the 3rd NEEAP projected savings of 375 ktoe in 2020, amounting to 14.5% of the Reference Scenario of that time. In absolute terms, primary energy consumption in the Additional Energy Efficiency Scenario is slightly higher than in the 3rd NEEAP. This is a combined effect of three changes:

- The faster-than-expected economic recovery of Cyprus, which has led to upwards revised GDP growth forecasts and hence to corresponding higher projections of energy demand especially in the buildings sectors (residential and services);

- The projected improvement in the energy intensity of the transport sector thanks to the successful implementation of CO_2 emission standards at EU level and the additional adoption of national legislation for CO_2-based vehicle taxes, which has led to a faster-than-expected reduction of the CO_2 levels of newly registered cars since 2014. This leads to comparatively lower energy demand in road transport;

- The stronger improvement in the efficiency of power generation, mainly as a result of a faster penetration of renewable electricity production than foreseen in the 3rd NEEAP. This in turn leads to lower primary energy needs in the electricity supply sector.

In other words, primary energy consumption in 2020 is forecast in the 4th NEEAP to remain at almost the same level with that of the 3rd NEEAP (2233 ktoe vs. 2201 ktoe respectively) because the expected increase in energy demand due to stronger economic growth is counterbalanced by lower energy intensity of road transport and power generation.

Energy savings, in both absolute and relative terms, are somewhat higher in the 4th NEEAP compared to the 3rd NEEAP, mainly because the improvements in the efficiency of power generation in the current Reference Scenario (which assumes that no natural gas will be used at least up to 2020) are not as strong as in the Additional Energy Efficiency Scenario. As a result, the difference between primary energy inputs for power generation between the two scenarios is larger than before, which becomes especially pronounced from 2019 onwards, when natural gas is expected to be used for producing a large fraction of total electricity in the Additional Energy Efficiency Scenario.

A second observation is that, similarly to the Additional Energy Efficiency Scenario of the 3rd NEEAP, almost half of the total savings (127+93 = 220 ktoe or 56%) are forecast to come from energy saving measures in end-use sectors and the other 44% (175 ktoe) from additional savings in primary energy consumption due to the use of natural gas in power generation.

Figure 1 illustrates the projected evolution of primary energy consumption up to 2020 for the two scenarios considered.

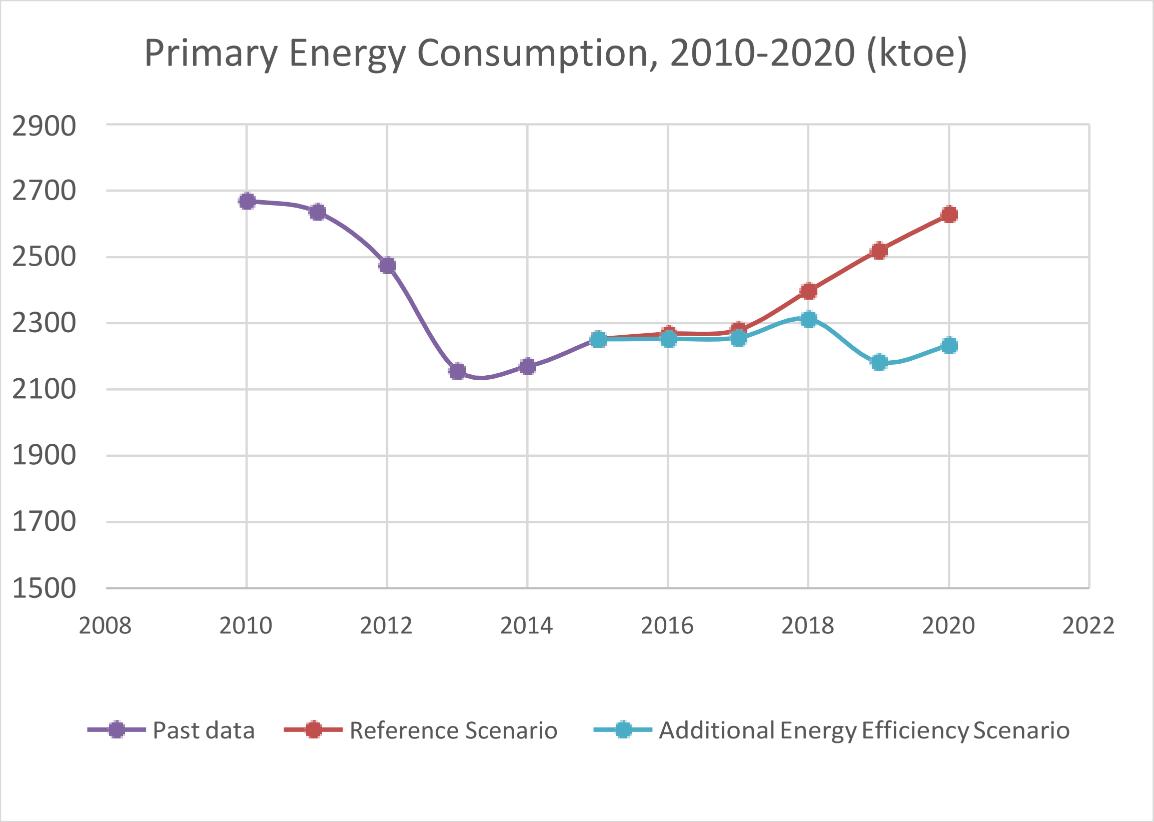

Figure 1: Projected evolution of primary energy consumption in Cyprus up to 2020 for the two scenarios considered in the 4th NEEAP.

Table 1: Macroeconomic assumptions for Cyprus as of March 2014.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real GDP (mio Euros at 2005 prices)	16784	16838	16307	15336	15101	15355	15769	16211	16665	17131	17611
Annual growth rate of GDP:	*1,3%*	*0,3%*	*-3,2%*	*-6,0%*	*-1,5%*	*1,7%*	*2,7%*	*2,8%*	*2,8%*	*2,8%*	*2,8%*
Real private consumption (mio Euros at 2005 prices)	10967	10894	10750	10117	10186	10376	10584	10817	11055	11287	11513
Annual growth rate of private consumption:	*3,3%*	*-0,7%*	*-1,3%*	*-5,9%*	*0,7%*	*1,9%*	*2,0%*	*2,2%*	*2,2%*	*2,1%*	*2,0%*
Sectoral shares of GDP:											
Agriculture	2,1%	2,2%	2,0%	2,0%	1,9%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Industry	8,9%	7,7%	7,0%	7,0%	7,1%	7,1%	7,2%	7,3%	7,4%	7,5%	7,6%
Construction	7,8%	7,2%	6,0%	4,9%	4,4%	4,2%	4,5%	4,8%	5,1%	5,4%	5,6%
Services	81,2%	83,0%	85,0%	86,1%	86,7%	86,6%	86,3%	85,9%	85,5%	85,2%	84,8%

Source: For years 2010-2016, official national accounts, Statistical Service of the Republic of Cyprus (as of October 2016).
For years 2017-2020, assumptions regarding GDP and private consumption from European Commission's
(see footnote 1) and national macroeconomic forecasts; sectoral GDP shares are author's own estimates.

Table 2: Procedure to adapt the Reference Scenario of the 3rd NEEAP to the data and macroeconomic forecasts of the 4th NEEAP.

Reference Scenario of 3rd NEEAP (2014)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Final non-electricity consumption for heating and cooling	424	421	405	371	349	345	350	366	387	410	432
Final non-electricity consumption in transport	1070	1077	992	902	828	819	831	868	923	972	1012
Final electricity consumption	415	397	392	362	346	352	364	387	416	444	471
Primary energy input for power generation	1194	1146	1097	1011	940	936	950	989	1041	1091	1132
Primary energy consumption	2688	2643	2494	2284	2118	2100	2131	2223	2351	2473	2575
Final energy intensity (toe/Meuro'2005)	126,4	124,8	120,7	117,4	114,9	113,3	113,4	116,2	121,0	125,7	129,5
Final energy intensity index (2010 = 100)	100,0	98,7	95,5	92,9	90,9	89,6	89,7	91,9	95,8	99,5	102,4
Final non-transport energy intensity (toe/Meuro'2005)	55,6	53,9	53,8	52,7	52,5	52,1	52,4	54,0	56,3	58,8	61,1
Final non-transport energy intensity index (2010 = 100)	100,0	96,9	96,9	94,8	94,4	93,8	94,3	97,2	101,3	105,8	109,9
Final electricity intensity (toe/Meuro'2005)	27,5	26,1	26,5	26,0	26,1	26,3	26,7	27,8	29,1	30,6	31,8
Final electricity intensity index (2010 = 100)	100,0	95,2	96,4	94,7	95,1	95,8	97,3	101,1	106,1	111,4	115,9
Final transport energy intensity (toe/Meuro'2005)	70,8	70,9	66,9	64,8	62,4	61,2	61,0	62,2	64,7	66,9	68,4
Final transport energy intensity index (2010 = 100)	100,0	100,2	94,5	91,5	88,2	86,4	86,1	87,8	91,4	94,5	96,6
Primary energy intensity (toe/Meuro'2005)	177,9	174,1	168,3	164,0	159,7	156,9	156,3	159,3	164,9	170,2	174,1
Primary energy intensity index (2010 = 100)	100,0	97,8	94,6	92,2	89,7	88,2	87,9	89,5	92,7	95,7	97,9

Table 3: Forecast of national energy demand in Cyprus in the two scenarios and breakdown of energy savings by sector.

4th NEEAP

Final energy demand for heating and cooling (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	838	816	757	708	725	740					
Reference scenario						740	763	807	864	926	987
Additional energy efficiency scenario						740	772	805	848	897	933

Final energy demand in transport (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1063	1070	990	890	866	911					
Reference scenario						911	932	973	1036	1097	1149
Additional energy efficiency scenario						911	926	940	954	970	983

Final electricity demand (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	415	397	376	336	339	351					
Reference scenario						351	367	392	424	459	492
Additional energy efficiency scenario						351	364	373	380	390	400

Final energy demand (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1901	1886	1747	1597	1591	1651					
Reference scenario						1651	1695	1780	1900	2023	2136
Additional energy efficiency scenario						1651	1699	1745	1801	1867	1916

Primary energy input for power generation (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	1184	1147	1104	896	918	952					
Reference scenario						952	940	892	923	956	985
Additional energy efficiency scenario						952	918	885	892	705	717

Primary energy consumption (ktoe)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Past data	2670	2637	2475	2157	2170	2252					
Reference scenario						2252	2268	2280	2398	2520	2628
Additional energy efficiency scenario						2252	2254	2257	2313	2183	2233

Savings in 2020 primary energy consumption between Reference Scenario and Additional Energy Efficiency Scenario

	(ktoe)	(%)
Savings in heating and cooling	55	5,5%
Savings in transport	165	14,4%
Savings in final energy consumption	220	10,3%
Savings in power generation	268	27,2%
Total savings in primary energy consumption, of which:	**395**	**15,0%**
due to savings in final non-electricity consumption	*127*	
due to savings in final electricity consumption	*93*	
due to the use of natural gas in power generation	*175*	

ANNEX I: URLs

No	Description of legislation / document / scheme	Reference to the text of the 4th NEEAP	E-mail
1	Sustainable Energy Action Plan for municipalities and communities in Cyprus.	Chapter 1, Paragraph 21	http://www.cea.org.cy/LocalEnergy.html
2	Green Public Procurement Action Plan.	Chapter 1, Paragraph 24	http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/9B99E4EB2CA7A90DC2257F64003CF378?OpenDocument
3	Cyprus National Energy Efficiency Programme.	Chapter 3.1.1, Paragraph 24	https://ec.europa.eu/energy/en/topics/energy-efficiency-directive/obligation-schemes-and-alternative-measures
4	Energy Auditors Regulations (RAA 184/2012).	Chapter 3.1.2, Paragraph 1	http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument
5	Methodology and Other Requirements for Conducting Energy Audits Decree (RAA 171/2012).	Chapter 3.1.2, Paragraph 3	http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument
6	Register of energy auditors.	Chapter 3.1.2, Paragraph 2	http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument
7	Calculations on cost-optimal levels of minimum energy performance.	Chapter 3.2.1, Paragraph 1	http://www.mcit.gov.cy/mcit/mcit.nsf/All/E074577C58AD9EFCC22575B60047BEA8?OpenDocument
8	Alternative approach to enhancing the energy efficiency of buildings owned and operated by central government authorities, in accordance with Article 5(6) of Directive 2012/27/EU on energy efficiency (Exemplary role of buildings owned by the central government).	Chapter 3.3.1, Paragraph 2	http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument

ANNEX J: LIST OF BODIES THAT HAVE CONTRIBUTED TO THE DRAFTING OF THE 4TH NEEAP.

No	ORGANISATION
1	Special Fund for RES and ES
1	Department of Road Transport
2	Electricity Authority of Cyprus
3	Cyprus Transmission System Operator
4	Ministry of Transport, Communications and Works - Department of Public Works
5	Ministry of Transport, Communications and Works - Department of Electrical and Mechanical Services
6	Ministry of Justice and Public Order - Cyprus Police
7	Ministry of Justice and Public Order - Cyprus Prisons Departments
8	Minister for Education and Culture
9	Competent public procurement authority of the Treasury of the Republic of Cyprus
10	Department of Information Technology Services
11	Town Planning and Housing Department
12	Cyprus Fire Service Headquarters
13	Union of Cyprus Municipalities
14	Union of Cyprus Communities
15	Hellenic Bank Group
16	Municipality of Nicosia
17	Municipality of Deryneia
18	Municipality of Agios Dometios
19	Municipality of Larnaca

ANNEX K: INFORMATION ON CALCULATING THE TARGET REFERRED TO IN ARTICLE 7 OF DIRECTIVE 2012/27/EU – LIST OF MEASURES

1. METHOD USED FOR CALCULATING THE CUMULATIVE TARGET FOR THE PERIOD 2014-2020.

1. The following parameters have been taken into account for calculating the cumulative energy savings:

(i) Motor fuels have been fully excluded from the final consumption quantity for calculating the target, as is applicable under Subparagraph 2 of Article 7(1).

(ii) The fuels used by autoproducers to produce heat and electricity, the production of heat by cogeneration, the production of electricity from autonomous photovoltaics and the production of electricity from autonomous wind parks have been excluded from the final consumption quantity for calculating the target. The data used are national, as not all these data were available from Eurostat.

(iii) Twenty per cent (25 %) has been subtracted from the calculated mandatory energy savings target, which represents the energy savings quantity that may be subtracted, as referred to in Article 7(3), by applying:

(A) in calculations, a lower annual energy savings percentage per year, as specified in Subparagraph (a) of Article 7(2) and

(B) the exception from the calculations for the target concerning the part of sales of power referred to in Subparagraph (b) of Article 7(2) and, in the case of Cyprus, concerning Pet-coke and Coal.

(iv) The data on final energy consumption (B_101700) for 2010 and 2012 were received from the Statistical Office of the European Union (Eurostat), and are available in **Table 1**.

TABLE 1: CYPRUS - FINAL ENERGY CONSUMPTION BY SECTOR FOR 2010 -2012 (DATA FROM EUROSTAT)

Code	B_101700	B_101800	B_101900	B_102010	B_102030	B_102035	B_102040
Sector / year	**Final Energy Consumption (TOE)**	**Industry (TOE)**	**Transport (TOE)**	**Residential (TOE)**	**Agriculture/ Forestry (TOE)**	**services (TOE)**	**Non- specified (other) (TOE)**
2010	1.919.500	233.400	1.047.600	330.900	39.900	247.800	19.700
2011	1.911800	206.500	1.051.400	349.900	42.900	235.900	25.000
2012	1.757.800	162.700	969.700	345.600	41.600	221.200	16.800
Source of Data: Eurostat, Last update: 18/03/14							

(v) The data on final energy consumption in transport (code B_101900), which have been excluded from the calculations, were received for 2010-2012 from the Statistical Office of the European Union (Eurostat), and are available in **Table 1**.

(vi) Note that electricity consumption was converted into TOE using the conversion rate of 1 kWh = 0.086 * 10^{-3} TOE, as both calculations concerning end use and the mandatory cumulative target are included in the calculation for final energy consumption.

2. CALCULATION OF THE MANDATORY CUMULATIVE TARGET FOR THE PERIOD 2014-2020

1. The average final electricity consumption in Cyprus for the period 2010-2012 after the subtractions referred to in subparagraphs (i) and (ii) of Article 2(1) above amounts to **766 946 TOE** (**Table 2)**.

TABLE 2: CALCULATION OF THE AVERAGE FINAL CONSUMPTION FOR THE PERIOD 2010-2012							
Item No.	**Source of Data**	**Sector**	**Description of the Indicator**	**Units**	**Quantity /Year**		
					2010	**2011**	**2012**
1	Eurostat	All Sectors	**Final Energy Consumption**	TOE	1919500	1911800	1757800
2	Eurostat		Final energy consumption in Transport	TOE	1047600	1051400	969700
3	National Data	See Table 5	Solar Thermal for own use	TOE	61070	62991	64477
4	National Data		Geothermal for own-use	TOE	753	1045	1477
5	National Data		Heating from CHP (Biomass) for own-use	TOE	3274	5300	5382
6	National Data		Autonomous Photovoltaics	TOE	134	147	148
7	National Data		Wind energy (for own-use)	TOE	5	5	37
8	National Data		Electricity production for own-use	TOE	3675	2066	1574
9	National Data		Heating Production for own-use	TOE	3683	2203	115
Total Final Consumption for the purposes of Article 7.					799306	786643	714890
Average Final Consumption					766.946		

2. The mandatory cumulative energy savings target, without applying any exemption, amounts to **322 117 TOE** (**Table 3**).

TABLE 3: CALCULATION OF THE ENERGY SAVING TARGET FOR THE PERIOD 2014-2020		
Average Final Consumption (TOE)	**766946**	
Multiplier	**1.5%**	
YEAR	**NEW YEARLY ENERGY AMOUNT TO BE SAVED (TOE)**	**NO OF YEARS**
2014	11504,2	1
2015	23008,4	2
2016	34512,6	3
2017	46016,8	4
2018	57521,0	5
2019	69025,2	6

2020	80529,4	7
Cumulative Energy Saving Target of the period 2014-2020 (TOE)	**322.117**	
Reduction of 25% due to exceptions of paragraph 2 of Article 7. TOE	80.529	
Final Cumulative target of the period 2014-2020 (TOE)	**241.588**	

3. The maximum amount of energy savings that can be excluded from Cyprus ' target amounts to **80 529 TOE** (25 % of target). Therefore, the minimum cumulative savings target for the period 2014-2020 amounts to **241 588 TOE** (**Annex 3**).

4. By applying the exemption referred to above in paragraph 2.1.iii (B), i.e. by subtracting from final consumption an amount equal to 46.5 % or **40 365 TOE** (**Table 4, Annex 4**) of the average energy used during the 2010-2012 period by Cypriot cement industries and then applying the methodology that provides a lower annual energy savings percentage per year, as referred to above in paragraph 2.1.iii(B), the cumulative energy savings target for Cyprus for the 2014-2020 period amounts to **241 588 TOE** (**Table 5)**.

TABLE 4: CALCULATION OF THE AVERAGE QUANTITY USED IN ETS INDUSTRY FOR THE PERIOD 2010-2012

Item No.	Source of Data	Sector	Description of the Indicator	Units	Quantity/Year		
					2010	**2011**	**2012**
1	National Data	Cement Industry	**Pet-coke**	TOE	88365	76157	71340
2	National Data	Cement Industry	Coal	TOE	17562	7117	0
TOTAL				TOE	105927	83274	71340
AVERAGE FOR PERIOD 2010-2012				TOE	86847		
AVERAGE AMOUNT TO BE DEDUCTED FOR CALCULATING THE TARGET				TOE	**40365**		**46.5%**

Table 5. Energy Saving calculations for the period 2014-2020 Based on a lower annual saving rate

Average Final Consumption for the period 2010-2012 (Excluding 46.5% i.e. 40.365 TOE of the average amount of energy used in ETS Industry)		**726581**
	YEAR	**Multiplier**
	2014	**1.00%**
	2015	**2.00%**
	2016	**3.25%**
	2017	**4.50%**
	2018	**6.00%**
	2019	**7.50%**
	2020	**9.00%**
YEAR	**NEW YEARLY AMOUNT TO BE SAVED (TOE)**	
2014	7265.81	
2015	14531.63	
2016	23613.89	

2017	32696.16
2018	43594.88
2019	54493.59
2020	65392.31
Final Cumulative target of the period 2014-2020 (TOE)	**241. 588**

3. LIST OF MEASURES AIMING TO ATTAIN THE CUMULATIVE TARGET FOR THE 2014-2020 PERIOD.

List of measures planned / expected to be implemented to attain the energy savings target referred to in Article 7.		
No	**Description of measures**	**Expected cumulative energy savings in 2020 (TOE)**
1. Proposals by the European Regional Development Funds (ERDF) and the Cohesion Fund (CF) for making effective use of resources.		
1.1	Investments in energy efficiency and use of RES in public buildings.	5 131
1.2	Scheme for promoting energy efficiency and use of RES by enterprises.	67 714
1.3	Plan for promoting energy efficiency and use of RES by households.	42 859
TOTAL OF CATEGORY 1		**115 705**
2. Installation of photovoltaic systems and smart meters.		
2.1	Installation of photovoltaic systems for autoproduction by business consumers and photovoltaic systems using the net metering method in the residential sector	68 951
2.2	Installation of an integrated AMI system with 500 000 smart meters.	58 695
TOTAL OF CATEGORY 2		**127 646**
TOTAL OF CATEGORIES 1 AND 2		**243 351**