



MINISTRY OF
ENVIRONMENT
ENERGY &
CLIMATE
CHANGE

First Progress Report on the Promotion and Use of Energy from Renewable Sources in Greece

Submitted under Article 22 of Directive
2009/28/EC

2012

PREFACE

Greece's commitment towards the higher penetration of RES in the Greek energy system is translated in a significant number of regulatory and fiscal initiatives that became active from 2010 and onwards, aiming to streamline and facilitate the growth and use of RES in electricity, heating and transport.

This report presents the efforts and implemented measures since 2009, the achieved results in the different sectors, while it also provides preliminary findings from the progress achieved in 2011.

Ministry of Environment, Energy & Climate Change (MEECC) believes that this progress report along with the national reports and action plans for Energy Efficiency and High-efficiency Cogeneration demonstrate the vision and goal to achieve the 2020 targets and beyond, while the mandates presented here are in line with the strategic national energy planning.

The exploitation of RES in the Greek energy system remains a key driver for achieving sustainable growth, while the significant potential for power production from RES technologies can serve in multifold ways towards the creation of new markets and business opportunities that could contribute significantly to the growth of the Greek economy.

Box 1 – structure of national progress report under Directive 2009/28/EC

The present progress report is following the template provided by the EC and is structured in twelve different thematic sections.

The technical work for the preparation of this progress report was undertaken by Centre for RES (CRES) and MEECC.

The elaboration and finalization of the report was done by CRES under the supervision of the Directorate General for Energy and Climate Change of the MEECC, as well as by the Assistance Office for Renewable Energy Sources Investments of the MEECC.

This report aims to act complementary to the Greek NREAP and the placed tables within this report provide valuable data and information for monitoring the progress and impact from the recent actions in relation to the penetration of RES.

All presented data, calculation rules and terminology follow the provisions laid down in Directive 2009/28/EC and those of Regulation (EC) No. 1099/2008 of the European Parliament and the Council.

I. SECTORAL AND OVERALL SHARES AND ACTUAL CONSUMPTION OF ENERGY FROM RENEWABLE SOURCES IN 2009 AND 2010(ARTICLE 22 (1) A OF DIRECTIVE 2009/28/EC).

The penetration of RES in the Greek energy system, in terms of share in gross final energy consumption, reached and slightly surpassed the projected figures in the NREAP for the period 2009-2010.

Especially for RES-E, the initially positive findings of 2010 are further augmented in 2011. In specific, the 2011 preliminary findings demonstrate an accelerated growth rate for RES-E applications, a fact that is mainly attributed to the new regulatory framework for RES-E and the maintaining investment interest.

The favourable FIT scheme, especially for certain technologies, along with the rationalization of the administrative and licensing procedure resulted in more than doubling of the new installed capacity for certain technologies (i.e. photovoltaic) in 2011 and the unblocking of some previously observed bottlenecks in the early stages of the licensing procedure.

On top of that, the new legislative framework for RES-H and RES-T (e.g. energy performance of buildings regulation-KENAK), as well as the availability of new market opportunities and mechanisms (e.g. ESCOs) is expected to create the appropriate conditions for the increase share of RES in these end-use sectors.

The effects of the economic recession, at least for the time being, seem to mainly affect the absolute levels of final energy consumption, especially in the building and transport sector and at lower extent the use of RES systems at the final energy use stage (i.e. solar thermal systems for domestic hot water and heat pumps for space heating and cooling). In the latter cases (i.e. for RES-H) a restrain in the growth rate is mainly observed, while in some other cases (i.e. biomass for heating uses) an even higher contribution than what was expected seems to be achieved. In specific, the significant drop in the energy demand, even higher than the one projected in the NREAP(see Figure 1), resulted for 2010 to RES shares in line or even higher than the ones initially forecasted.

However, it should be noted that considering the existing difficulties regarding access to finance (both for investors and consumers), the growth rates achieved in 2011 (at least for RES-E) may be intercepted in the short-term. Therefore, the RES trajectory should be closely and continued monitored in order to identify delays and barriers in the RES development or overburdening of consumers and make possible the undertaking of additional measures if required.

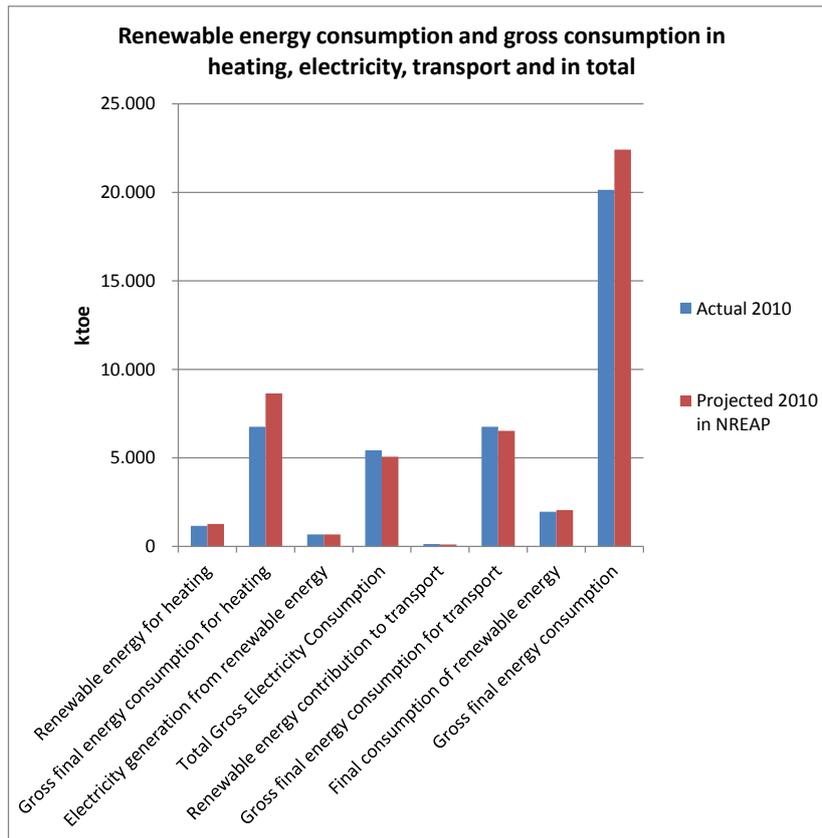


Figure 1. Renewable energy consumption and gross energy consumption in heating, electricity, transport and in total for the year 2010 (actual and as projected in the NREAP)

The tables that follow present these findings. At the same time it should be noted that different growth rates per technology and/or type of use are observed, thus emphasizing that the advancement of each application/technology is governed by different or even contradicting elements.

The early RES utilization and installation data figures for 2011, already exhibit that the RES-E shares are in accordance with the trajectory presented in the NREAP, while the penetration and shares in heating and transport continue to demonstrate a slight but steady growth. Figure 2 presents the new installed capacity of wind and photovoltaics parks for the years 2009, 2010 and, provisionally, for 2011 whereas is demonstrated that for both technologies in 2011 there was at least 2.5 times more installed capacity than the one in 2010.

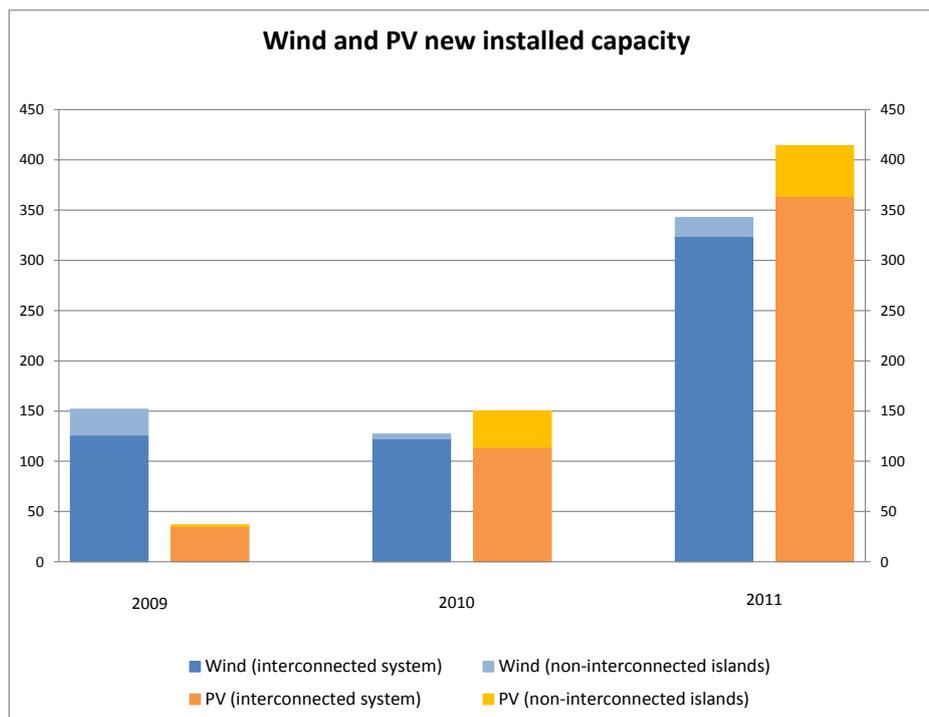


Figure 2. Newly installed capacity of wind and photovoltaics

However, as stated before, these facts while encouraging should not create complacency, as many constraints/barriers have to be further addressed. The antidote, considering also the difficulties in financing new investments, is a) to further tackle administrative barriers and delays due to lack of coordination among authorities (especially for RES-E), b) to strengthen the investors' confidence in long-term viability of the RES scheme by rationalizing the feed-in tariffs and c) the further mobilization of the National Strategic Reference Framework for energy efficient actions in all the end-use sectors. Towards this direction, the Greek government in 2011, announced and legislated appropriate tools and programmes, while in 2011 and in the first months of 2012 temporary measures especially for the RES-E support mechanism were taken in order to ensure the sustainability of the RES-E market.

Measures for the improvement of energy efficiency, along with an updated regulatory framework in the different end-use sectors are also seen as supplementing the efforts to exploit the significant potential in Greece for a number of RES-H technologies and at the same time creating new market opportunities in the current business environment.

Table 1: The sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources¹

	2009	2010
RES-H&C ² (%)	16.38%	17.17%
RES-E ³ (%)	11.04%	12.38%
RES-T ⁴ (%)	1.13%	1.97%
Overall RES share ⁵ (%)	8.43%	9.73%
<i>Of which from cooperation mechanism⁶ (%)</i>		
<i>Surplus for cooperation mechanism⁷ (%)</i>		

Table 1a: Calculation table for the renewable energy contribution of each sector to final energy consumption (ktoe)⁸

	2009	2010
(A) Gross final consumption of RES for heating and cooling	1,098	1,160
(B) Gross final consumption of electricity from RES ⁹	703	909
(C) Gross final consumption of energy from RES in transport ¹⁰	78	128
(D) Gross total RES consumption ¹¹	1,879	2,197
(E) Transfer of RES <u>to</u> other Member States	0	0
(F) Transfer of RES <u>from</u> other Member States and 3rd countries	0	0
(G) RES consumption adjusted for target (D)-(E)+(F)	1,879	2,197

¹Facilitates comparison with Table 3 and Table 4a of the NREAPs.

² Share of renewable energy in heating and cooling: gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5(1)b) and 5(4) of Directive 2009/28/EC divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of NREAPs applies.

³ Share of renewable energy in electricity: gross final consumption of electricity from renewable sources for electricity (as defined in Articles 5(1)a) and 5(3) of Directive 2009/28/EC divided by total gross final consumption of electricity. The same methodology as in Table 3 of NREAPs applies.

⁴ Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Article 5(1)c) and 5(5) of Directive 2009/28/EC divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of NREAPs applies.

⁵ Share of renewable energy in gross final energy consumption. The same methodology as in Table 3 of NREAPs applies.

⁶ In percentage point of overall RES share.

⁷ In percentage point of overall RES share.

⁸ Facilitates comparison with Table 4a of the NREAPs

⁹ This figure is the actual electricity generation from RES in 2009 and 2010, not normalized for hydro and wind and not including generation from water previously pumped uphill

¹⁰ Not including electricity from RES consumed in transport (only biofuels)

¹¹ According to Art.5(1) of Directive 2009/28/EC gas, electricity and hydrogen from renewable energy sources has been considered once.

Table 1.b: Total actual contribution (installed capacity, gross electricity generation) from each renewable energy technology in Greece to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity¹²

	2009		2010	
	MW	GWh	MW	GWh
Hydro ¹³ :	3,201	5,621 (4,287)	3,215	7,498 (4,525)
non pumped	2,502	4,714	2,516	6,597
<1MW	32	115	34	130
1MW–10 MW ¹⁴	151	543	163	624
>10MW ¹⁵	2,319	4,056	2,319	5,843
pumped	-	-	-	-
mixed ^{16,17}	699	907 (268)	699	901 (23)
Geothermal	-	-	-	-
Solar:	53	54	203	167
photovoltaic ¹⁸	53	54	203	167
concentrated solar power	-	-	-	-
Tide, wave, ocean	-	-	-	-
Wind ¹⁹ :	1,171	2,547 (2,671)	1,298	2,714 (2,905)
onshore	1,171	2,547	1,298	2,714
offshore	-	-	-	-
Biomass ²⁰ :	41	218	43	216
solid biomass	-	-	-	-
biogas	41	218	43	216
bioliquids	-	-	-	-
TOTAL ²¹	4,466	8,172	4,760	10,572
of which in CHP	0	0	0	0

Table 1c: Total actual contribution (final energy consumption²²) from each renewable energy technology in Greece to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling (ktoe)²³

	2009	2010
Geothermal (excluding low temperature geothermal heat in heat pump applications)	16	16
Solar	182	183
Biomass ²⁴ :	844	892
solid biomass	843	890
biogas	1,3	2
bioliquids	-	-
Renewable energy from heat pumps:		
- of which aérothermal	56	69
- of which geothermal	51	63
- of which hydrothermal	5	6
TOTAL	1,098	1,160
Of which DH ²⁵	0	0
Of which biomass in households ²⁶	554	597

¹²Facilitates comparison with Table 10a of the NREAPs.

¹³Actual hydro electricity generation. The normalised electricity in accordance with Directive2009/28/EC and Eurostat methodology (not including electricity produced from water previously pumped uphill) is given in the parenthesis.

¹⁴ For the Greek case, this category includes hydro plants up to 15MW, since these come under the special feed-in tariff of small hydro plants according to the provisions of L.3468/2006.

¹⁵ This figure does not include the gross electricity production from mixed pumped storage plants

¹⁶In accordance with new Eurostat methodology.

¹⁷ The figure in the parenthesis refers to the electricity produced from water previously pumped uphill

¹⁸ These include stand-alone PV stations that are estimated to be 4,5MW in the end of 2009 and 4,7MW in the end of 2010

¹⁹Actual wind electricity generation. The normalised electricity in accordance with Directive2009/28/EC is given in the parenthesis.

²⁰ Only those complying with applicable sustainability criteria, cf. Article 5(1) of Directive 2009/28/EC last subparagraph, are taken into account.

²¹ Not including electricity produced from water previously pumped uphill

²² Direct use and district heat as defined in Article 5.4 of Directive 2009/28/EC.

²³Facilitates comparison with Table 11 of the NREAPs.

²⁴ Only those complying with applicable sustainability criteria, cf. Article 5(1) last subparagraph of Directive 2009/28/EC are taken into account.

²⁵ District heating and / or cooling from total renewable heating and cooling consumption (RES- DH).

²⁶ From the total renewable heating and cooling consumption.

Table 1d: Total actual contribution from each renewable energy technology in Greece to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector (ktoe)^{27,28}

	2009	2010
Bioethanol/ bio-ETBE	-	-
<i>Of which Biofuels²⁹ Article 21.2</i>	-	-
<i>Of which imported³⁰</i>	-	-
Biodiesel	78	128
<i>Of which Biofuels³¹ Article 21.2</i>	5	12
<i>Of which imported³²</i>	7	15
Hydrogen from renewables	-	-
Renewable electricity	3	3
<i>Of which road transport</i>	2	2
<i>Of which non-road transport</i>	1	1
Others (as biogas, vegetable oils, etc.) – please specify	-	-
<i>Of which Biofuels³³ Article 21.2</i>	-	-
TOTAL	81	131

2. MEASURES TAKEN IN THE LAST TWO YEARS AND/OR PLANNED AT NATIONAL LEVEL TO PROMOTE THE GROWTH OF ENERGY FROM RENEWABLE SOURCES TAKING INTO ACCOUNT THE INDICATIVE TRAJECTORY FOR ACHIEVING THE NATIONAL RES TARGETS AS OUTLINED IN YOUR NATIONAL RENEWABLE ENERGY ACTION PLAN (ARTICLE 22(1) A OF DIRECTIVE 2009/28/EC).

During the last two years various measures have been implemented in order to foster the development of RES in the Greek energy system. These measures are grouped in three main categories, regulatory, technical and financial. The full list of these measures undertaken during the last two years (2010-2011) is presented in table 2, which updates and complements table 5 of the Greek NREAP. It should be highlighted that in March 2012, L.4062/2012 (OG 70A/30.03.2012) came into effect, which fully transposes Directive 2009/28/EC (and 2009/30/EC) into the national legislative framework.

Table 2: Overview of all policies and measures

	Name and reference of the measure	Type of measure	Exp. result	Targeted group and or activity	Existing or planned*	Start and end dates of the measure ³⁴
1.	L.3851/2010 “Accelerating the development of Renewable Energy Sources to deal with climate change and other regulations in topics under the authority of MEECC” (OG A 85/04.06.2010)	Regulatory/ Financial		investors, end users, public administration	Existing in NREAP	2010-2020
2.	L.4001/2011 “Operation of energy markets for electricity and natural gas, for research, production and transmission networks of hydrocarbons and other provisions” (OG A 179/22.8.2011)	Regulatory		Investors, public administration	Complementary to NREAP	2011-2020

²⁷ Only biofuels that are compliant with the sustainability criteria, cf. Article 5(1) last subparagraph, are taken into account.

²⁸ Facilitates comparison with Table 12 of the NREAPs.

²⁹ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

³⁰ From the whole amount of bioethanol / bio-ETBE.

³¹ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

³² From the whole amount of biodiesel. Regarding biodiesel, the imported quantities refer to biodiesel from production units placed in other EU member-states. From the whole amount of biodiesel, 25 ktoe and 72 ktoe are produced from Greek raw materials, in 2009 and 2010 respectively, according to available data. There are no data available regarding the origin for the rest of the quantities.

³³ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

³⁴ If no otherwise specified, end date of the measure is set 2020

3.	Law 3855/2010 “Measures to improve energy efficiency in end-use, energy services and other provisions”, articles for public buildings and development of the ESCO market(OG A 95/23.6.2010)	Regulatory		End consumers, energy companies-utilities, public administration	Existing in NREAP	2010-2020
4.	Simplification of environmental licensing procedure and annulment of forest land intervention approval (L4014/2011, OG A 209/21.09.2011)	Regulatory		investors, end users, public administration	Complementary to NREAP	2011-2020
5.	Exemption of electric and /or hybrid and/or low emission vehicles from the fuel consumption tax, the additional special tax, the circulation tax and/or the registration tax (L.3831/2010, OG A 34/25.2.2010)	Regulatory, financial		End users	Existing in NREAP	1992-2020
6.	Guidelines to RAE for the implementation of L3851/2010 provisions, regarding Article 2, par. 1 and Article 15, par.3 (Circular AY/Φ1/οικ.14586/19.07.2010)	Regulatory		RAE, Investors, public administration	Complementary to NREAP	2010-2020
7.	Regulation on the licensing for production of electricity by RES and high efficiency co-generation (MD ΥΑΠΕ/Φ1/14810, OG B 2373/25.10.2011)	Regulatory		Investors, public administration	Complementary to NREAP	2011-2020
8.	Registry for licenses and data reporting (MD Υ.Α.Π.Ε./Φ1/οικ.24840, OG B 1900, 03.12.2010)	Regulatory		Investors, public administration	Complementary to NREAP	2010-2020
9.	Clarifications on the new provisions for RES licensing procedure set by L4014/2011 concerning the annulment of forest land intervention approval (Circular οικ.4709.111/14.12.2011)	Regulatory		Investors, public administration	Complementary to NREAP	2011-2012
10.	Clarifications regarding the examination of applications for the installation of RES electricity systems in agricultural land of high productivity (Circular Υ.Α.Π.Ε./Φ1/οικ.26928/16.12.2010)	Regulatory		Investors, public administration	Complementary to NREAP	2010-2020
11.	Guidelines for the licensing and development of conventional Power Producers in order for them to be flexible and support RES penetration (RAE, public consultation)	Regulatory		Investors, public administration, planners	Planned in NREAP	2012-2012
12.	Decision for the desired ratio of RES-E installed capacity in time and relevant exemptions of types of RES-E plants (fast track projects, PV buildings, geothermal projects) from the foreseen threshold (MD Α.Υ./Φ1/οικ.19598, OG B 1630/11.10.2010)	Regulatory		Investors, public administration	Complementary to NREAP	2010-2020
13.	Implementation of the system for the guarantees of origin of electricity produced by RES and high efficiency cogeneration (MD Δ6/Φ1/οικ.8786, OG B 646/14.05.2010)	Regulatory		Investors, public administration	Complementary to NREAP	2010-2020
14.	Implementation of the GoO and description of the methodology, mechanism and supervising/issuing bodies (MD Υ.Α.Π.Ε./Φ1/οικ. 24839, OG B 1901/03.12.2010)	Regulatory		Investors, end consumers, public administration	Complementary to NREAP	2010-2020
15.	Approval of the special terms for the deployment of photovoltaics and solar systems on fields and buildings (MD 40158, OG B 1556/22.09.2010 and MD 36720, OG 376/6.09.2010)	Regulatory		Investors, public administration, planners	Complementary to NREAP	2010-2020
16.	Modifications on the special terms for the deployment of photovoltaics and solar systems on fields and buildings (MD 539771, OG B 583/14.04.2011)	Regulatory		Investors, public administration, planners	Complementary to NREAP	2010-2020
17.	Supplementation of special technical details for the spatial location criteria of small hydro plants (MD οικ. 196978, OG B 518/05.04.2011)	Regulatory		Investors, public administration	Complementary to NREAP	2011-2020
18.	Inclusion of the use of solid biomass (pellets, woodchips, etc) to the permitted fuels for heating purposes in urban areas (MD οικ.189533, OG B 2654/09.11.2011)	Regulatory		End consumers, household sector, small businesses	Complementary to NREAP	2011-2020
19.	Definition of terms and procedure for research activities and management of the geothermal potential of low temperature geothermal areas (MD Δ9B,Δ/Φ166/οικ25158/ΓΔΦΠ4398, OG B 2647/09.11.2011)	Regulatory		Investors, public administration	Complementary to NREAP	2011-2020
20.	Licensing for the distribution of thermal energy exclusively for agricultural purposes by exploiting geothermal potential of low temperature geothermal areas (MD Δ9B/Φ166/23880/ΓΔΦΠ4211, OG B 2450/02.11.2011)	Regulatory		End consumers, public administration, planners	Complementary to NREAP	2011-2020
21.	Invitation for the participation in 2010 biodiesel allocation (JMD Δ1/Α/10085, OG B 750 /19.05.2010)	Regulatory		Biodiesel producers, public	Complementary to NREAP	2010-2010

				administration		
22.	Allocation of 164,000 kiloliters of biodiesel for the year 2010, in accordance with the provisions of Art. 15A, par. 7 of L.3054/2002 and its amendment (JMD Δ1/A/15555, OG B 1174/04.08.2010 as amended by Δ1/A/11079, OG B 1071/10.05.2011)	Regulatory		Biodiesel producers, refineries, oil companies, public administration	Complementary to NREAP	2010-2011
23.	Invitation for the participation in 2011 biodiesel allocation (JMD Δ1/A/13972, OG B 1307/16.06.2011)	Regulatory		Biodiesel producers, public administration	Complementary to NREAP	2011-2011
24.	Allocation of 132,000 kiloliters of biodiesel for the year 2011, in accordance with the provisions of Art. 15A, par. 7 of L. 3054/2002 (JMD Δ1/A/23603, OG B 2432/21.10.2011)	Regulatory		Biodiesel producers, public administration	Complementary to NREAP	2011-2012
25.	Approval of the Energy Performance of Buildings Regulation (MD Δ6/B/οικ. 5825, OG B 407/2010)	Regulatory		End consumers, household sector, small businesses, public administration, planners	Complementary to NREAP	2010-2020
26.	Methodological framework for measuring and verifying energy saving to meet the national indicative target for energy efficiency at the end-use sectors – List of indicative eligible measures to improve energy efficiency – Energy content of fuels for end use (MD Δ6/7094, OG B 918/23.05.2011)	Regulatory		public administration	Complementary to NREAP	2011-2016
27.	Operation, registry and code of conduct for energy services companies (MD Δ6/13280, OG B 1228/14.06.2011)	Regulatory		public administration, companies	Complementary to NREAP	2011-2020
28.	Support of private investment for economic development, entrepreneurship and regional cohesion (L.3908/2011, OG A 8/1.2.2011)	Financial		Investors, public administration	Complementary to NREAP	2010-2020
29.	Feed-in tariff for offshore wind installations (L4030/2011, OG A 249/25.11.2011)	Financial		Investors, public administration	Complementary to NREAP	2011-2020
30.	Tax reliefs on the purchase and installation of RES systems for heating as well as decentralized RES systems for electricity generation (L.3842/2010, OG A 58/23.04.2010)	Financial		End consumers, companies	Complementary to NREAP	2010-2020
31.	Special levy and incentives to residential consumers in areas where RES systems are installed (MD Y.A.I.I.E. /Φ1/οικ.28287/12.12.2011, OG B 3005/28.12.2011)	Financial		Investors, end consumers, public administration	Complementary to NREAP	2011-2020
32.	Supplementation of the special program for the deployment of photovoltaics up to 10kW on buildings and especially roofs (MD A.Y./Φ1/οικ.18513, OG B'1557/22.09.2010)	Financial		End consumers, household sector, small businesses	Complementary to NREAP	2010–2019
33.	Setting of tax issues in regards with PV installations up to 10kW on buildings (Circular Ministry of Finance, 1101/06.08.2009)	Financial		End consumers, household sector, small businesses	Complementary to NREAP	2009-2020
34.	The “Energy Efficiency at Household Buildings” Program (NSRF 2007-2013, JMD Φ.B1/E2.1/244/6, OG B 54/26.01.2011)	Financial		End consumers, household sector	Complementary to NREAP	2011-2013
35.	“Exoikonomo” Program for public authorities (NSRF 2007-2013, MD Φ.B1/E2.1/244/6, OG B 54 26.1.2011)	Financial		public administration, planners	Complementary to NREAP	2011-2013
36.	“Building the Future – Large Scale Interventions” Program (NSRF 2007-2013)	Financial		public administration, private companies	Complementary to NREAP	2011-2013
37.	“Green Pilot Urban Neighborhood” Program (NSRF 2007-2013)	Financial		public administration, planners, private companies	Complementary to NREAP	2011-2013
38.	“Bioclimatic Renewal of Urban Spaces” (NSRF 2007-2013)	Financial		public administration, planners	Complementary to NREAP	2011-2013
39.	“Green agricultural and island communities – New development model” Program (NSRF 2007-2013)	Financial		public administration, planners	Complementary to NREAP	2011-2013

40.	“Pilot bioclimatic school buildings” and “Pilot RES and EE projects on existing public school buildings” Programs (NSRF 2007-2013)	Financial		public administration, planners	Complementary to NREAP	2011-2013
41.	“Pilot RES and EE projects in public buildings” Program (NSRF 2007-2013)	Financial		public administration, planners	Complementary to NREAP	2011-2013
42.	Reinforcement of the interconnection capacity with neighbouring countries (increase of NTC on the existing interconnections + new interconnection with Turkey). Further actions and projects for the integration of the electricity system into the European grid through western Balkans	Technical		Investors, public administration, planners	Existing/ planned in NREAP	2010-2020
43.	Development of storage facilities in the interconnected system by exploiting hydro pumping system at existing large hydro plants and new installations (public consultation RAE)	Technical		public administration, planners	Planned in NREAP	2010-2020
44.	Further development of the distribution grid based on the smart grids principles (a pilot programme for the development of smart grids on 5 islands is announced in the context of NSRF 2007-2013)	Technical		Investors, public administration, planners	Planned in NREAP	2012-2020
45.	Application and reinforcement of the National Transmission Development Plan (NTDP), elaborated by the System Operator: a) Upgrading of grid interconnections in the mainland, b) Interconnection of the non-interconnected islands according to strategic planning elaborated by the System Operator	Technical		Investors, public administration, planners	Existing in NREAP	2010-2016
46.	Increase of maximum percentage of biodiesel blended in diesel from 5% to 7% per volume (MD 460/2009, OG B 67/28.01.2010)	Technical		Refineries, oil companies, public administration	Existing in NREAP	2010
47.	Guide for the assessment of projects for electricity generation from concentrating solar power (RAE)	Technical		Investors, public administration	Complementary to NREAP	2011-2020

2.1. Description of the progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of renewable energy (Article 22(1)e of Directive 2009/28/EC).

On the 4th of June 2010, L.3851/2010 “Accelerating the development of renewable energy sources to confront climate change and other topics under the authority of MEECC” has been put into force. The aim of this law is to establish a stable framework for the development of RES technologies, ensuring that authorization, certification and licensing procedures for renewable power plants are proportionate and necessary and that licensing procedures are transparent and expedited. The new RES law has introduced significant changes to previous legislation. Specifically, L3851/2010 simplifies and accelerates the licensing procedure, so that the penetration of RES in the Greek energy mix is enhanced.

The provisions of L.3851/2010 foresee the restructuring and rationalization of the licensing procedure especially for RES small-scale projects, in order to reduce drastically the time required until the operation of the plants. In this direction, thresholds so far set for RES projects to be exempted from any of the three licenses (production, installation and operation) are significantly exceeded. For all the above projects that enjoy an exemption from the licensing procedure and do not therefore go through an economical evaluation, an amount is required to be paid to guarantee that connection works start within a defined in the law time limit. Should the limit be violated, the amount gets deducted in favour of the special operating account for RES.

In addition to the above, L.3851/2010 introduced the concept of a “certificate of exemption” for small scale RES projects, to substitute the full EIA procedure, as shown in the table below.

RES technology	No exemption threshold foreseen before 4.6.2010	Exemption threshold after 4.6.2010 by virtue of L.3851/2010 [MW]
Geothermal energy		0.50
Biomass		0.50
PV & CSP		0.50
Wind		0.02

In view of the licensing process streamlining, L.3851/2010 has fixed strict terms and deadlines, within which approvals should be granted or consensus should be rendered by services and bodies involved in the interim stages of the overall licensing procedure. In particular L.3851/2010 sets an explicit obligation for all bodies involved in Environmental Impact Assessment (EIA) procedure to give their approvals/consensus within the strict framework of their competencies and in compliance with the rules set in the Spatial Planning and Sustainable Development for Renewable Energy Sources. Should these approvals/consensus not be notified within a strict timeframe, the responsible authority is entitled to issue the Environment Impact Assessment (EIA). In the same framework and in order to ensure transparency, equity and effectiveness strict deadlines also exist for authorities issuing permits within the RES licensing procedure. Should an installation license not be timely issued by regional authorities, the Minister of EECC is authorized to issue the permit within a precise timeframe. Moreover, a strict deadline for the issuance of a Grid Connection Offer is defined. Should the connection not be realized in a specified timeframe, the Grid Connection Offer ceases to be valid and grid capacity becomes available for new applications.

By virtue of L.3851/2010 and a series of ministerial decisions issued to deal with regulatory matters, a parallel process of the different phases of the licensing procedure is made possible and a scaled licensing procedure is for the first time fully implemented in PV technology, as shown in the table below.

	RES installations within limits of existing zoning plans		RES installations beyond limits of existing zoning plans	
	≤100kW	>100kW	≤100kW	>100kW
Buildings	Notification Procedure	Installations exempted from town-planning permit – static study necessary	Notification Procedure & certification for the building legality	Installations exempted from town-planning permit – static study necessary
Land	Installations forbidden if not applied as buildings auxiliary electrical/mechanical outfit		Installations exempted from town-planning permit and in addition exempted for consensus of involved licensing bodies ³⁵	Installations exempted from town-planning permit

Note: Town-planning permit additionally required in case of in situ heavy construction works.

RES-E Environmental Impact Approval is henceforth completed in one step, the Preliminary Environmental Impact Assessment (P.E.I.A.) stage of the previous legal framework having been omitted. Furthermore, a RES-E project generation license, granted by the Regulatory

³⁵Procedure is possible only through investors declaration that no existing rule is violated/infringed

Authority for Energy (RAE), is henceforth an initial approval, in the meaning that no precision of the land where the plant is installed and no P.E.I.A are required.

The provisions of L.3851/2010 further support the efficient implementation of the Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources made part of the Greek legal framework only in December 2008.

Furthermore, L.3851/2010 provides for the establishment of an Assistance Service for Renewable Energy Sources Investments to play one-stop agency's role in the near future. Currently, the Assistance Service for Renewable Energy Sources Investments under more competences is assigned the issuing of relevant legal and regulatory framework, the issuing of large scale projects' installation and operating permits, the creation of a registry on the development of RES-E licensing procedure, as well as relevant information for the plants.

Moreover, L.3851/2010 also includes provisions to enhance social acceptance in regard with RES projects at local level. In this frame a levy raised at 3% of gross proceeds from renewable energy sale (PV excluded) is allocated to local communities. A significant part of this levy (1% out of 3%) is provided directly to the household consumers of the municipality, where the RES project is installed, through the electricity bills. Moreover an additional 1% levy is imposed on small scale hydros gross proceeds from energy sale in favour of protected areas management agencies since 2009.

The main goal of L.3851/2010 is to facilitate and accelerate RES penetration in Greece so that the rate of installed capacity gradually reaches 500-1000MW annually. Table 3 presents the development of the licensing procedure for RES-E installations by the end of 2010 and 2011. The progress and acceleration of the licensing process is evident. The installed RES-E capacity has increased by 45% by the end of 2011 reaching 2.5 GW. The capacity of the projects that are in the last licensing phase has reached the amount of 4.5 GW.

Table 3: Overview of licensing procedure by the end of 2010 and 2011

in MW	Application for production license		Production license		Connection Offer		Installation license		Sale Contract		In operation	
	until end 2010	until end 2011	until end 2010	until end 2011	until end 2010	until end 2011	until end 2010	until end 2011	until end 2010	until end 2011	until end 2010	until end 2011
Wind	61,791	66,957	14,373	20,569	3,601	3,679	1,249	1,325	360	794	1,298	1,640
Biomass	1,462	1,591	243	410	42	44	21	28	1	5	44	45
Geothermal energy	341	346	8	8	0	0	0	0	0	0	0	0
Small Hydro	2,221	2,277	886	962	189	138	79	61	28	26	196	206
Photovoltaic ³⁶	4,255	6,996	1,565	3,291	525	2,798	320	429	497	1,701	198	626
CSP	963	1,084	0	394	0	11	0	0	0	0	0	0
Hybrid	1,743	1,872	263	536	0	0	0	0	0	0	0	0
TOTAL	72,775	81,122	17,339	26,171	4,358	6,670	1,670	1,842	886	2,526	1,736	2,516

³⁶The PV stations that are in operation are only those that are connected to the national electricity system (incl. the non-connected islands) and are relevant for the licensing procedure, thus they do not include the stand-alone PV systems.

L.3851/10 also includes important provisions for the use of renewable energy in new buildings (i.e. solar thermal systems, heat pumps, biomass, RES district heating), in accordance with the recently enacted regulation for the energy performance of buildings (OG B 407/2010), together with the Ministerial Decree OG B2654/2011 that allows the use of biomass for heating purposes in the metropolitan area of Athens and Thessaloniki. Furthermore L.3855/2010 also includes provisions improving energy performance in public sector.

Secondary legislation and/or technical reports that have been approved in the last two years also facilitate the development of RES technologies, such as **geothermal** (i.e. MD Δ9B,Δ/Φ166/οικ25158/ΓΔΦΠ4398 “Definition of terms and procedures for research activities and management of the geothermal potential of low temperature geothermal areas”, OG B 2647/2011 and MD Δ9B/Φ166/23880/ΓΔΦΠ4211 “Licensing for the distribution of thermal energy exclusively for agricultural purposes by exploiting geothermal potential of low temperature geothermal areas”, OG B 2450/2011), **small hydroplants** (i.e. MD οικ. 196978“Supplementation of special technical details for the spatial location criteria of small hydro plants”, OG B 518/2011) and **concentrating solar power plants** (“Guide for the assessment of projects for electricity generation from concentrating solar power”, RAE, November 2010).

2.2. Measures in ensuring the transmission and distribution of electricity produced from renewable energy sources and in improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements(Article 22(1)f of Directive 2009/28/EC).

L.3851/2010 includes special provisions for the incorporation and connection of plants producing electricity from RES to the electricity system. Under the provisions of this law, it is made possible that the owner of a RES-E plant owns a section of the plant’s connection works between the central distribution box of medium voltage of the RES-E plant and the transformer/substation of the national grid (the substation possibly included as well). In this case the plant owner becomes responsible for its management, operation and maintenance.

The owner of the connection works has to provide access to other RES-E producers, unless the network cannot absorb additional production, which is proven by the substantiated opinion of the Transmission System Operator. The new user compensates the owner for the use of the connection. A decision on the amount of the aforementioned payment and the detailed methodology of how this will be conducted is to be elaborated by the Regulatory Authority for Energy.

3. SUPPORT SCHEMES AND OTHER MEASURES CURRENTLY IN PLACE THAT ARE APPLIED TO PROMOTE ENERGY FROM RENEWABLE SOURCES AND ANY DEVELOPMENTS IN THE MEASURES USED WITH RESPECT TO THOSE SET OUT IN THE GREEK NATIONAL RENEWABLE ENERGY ACTION PLAN(ARTICLE 22(1)B OF DIRECTIVE 2009/28/EC).

Feed-in tariffs

The current scheme for guaranteed feed-in tariffs for electricity that is implemented in Greece is regulated by L.3851/2010, which updated and expanded the feed-in tariff rates. The tariffs are differentiated between RES technologies, considering project characteristics (i.e. capacity), co benefits and development cost.

Thus, higher feed-in tariff are set for plants with smaller installed capacity for wind energy, photovoltaics, CSP, biomass and biogas plants, taking into account the full economic parameters of smaller plants. Higher feed-in tariffs are also foreseen in L.4030/2011 for offshore wind farms.

The feed-in tariffs presented in the following table 4 are readjusted annually, indexed at 50% of the annual consumer index (recently imposed by L.4062/2012).

Table 4: Feed-in tariffs for electricity generated by renewable energy according to L. 3851/2010

RES Feed-in Tariffs	Per unit support (€/MWh)after 2010 (2011 for offshore wind)
Wind energy (onshore) with installed capacity > 50 kW	87.85 (99.45-for the non-connected islands)
Wind energy (onshore) with installed capacity ≤ 50 kW	250.00
Wind energy (offshore)	108.30
PV up to 10kWp installed capacity (5kWp on non- interconnected islands) in the residential sector and in small businesses (MD OG 1079 B/4.6.2009, MD OG 1557 B/22.09.2010)	550.00
Small hydro plants up to 15MW installed capacity	87.85
Concentrated solar power plants up to 5MW installed capacity	264.85
Concentrated solar power plants with installed capacity >5MW	
Concentrated solar power plants with storage facility that enables at least 2 hours of operation at nominal load	284.85
Geothermal energy of low temperature (according to par. 1στ, Art. 2, L3175/2003)	150.00
Geothermal energy of high temperature (according to par. 1στ, Art. 2, L3175/2003)	99.45
Biomass plants up to 1MW installed capacity (exc. Biodegradable municipal waste)	200.00
Biomass plants with installed capacity > 1MW and ≤ 5MW (exc. Biodegradable municipal waste)	175.00
Biomass plants with installed capacity > 5MW (exc. Biodegradable municipal waste)	150.00
Biogas plants from landfill and sewage sludge gas up to 2MW installed capacity (incl. Biodegradable municipal waste)	120.00
Biogas plants from landfill and sewage sludge gas with installed capacity > 2MW (incl. Biodegradable municipal waste)	99.45
Biogas plants from animal farming and agricultural residues and waste with installed capacity up to 3MW	220.00
Biogas plants from animal farming and agricultural residues and waste with installed capacity > 3MW	200.00
Other RES-E technologies	87.85 (99.45 for the non-connected islands)

For the photovoltaic installations, L.3851/2010 specified a phased decline (see Table 5 below) of the guaranteed price until the end of 2014, while the readjustment of the FIT for photovoltaic installations takes place annually indexed at 25% of the annual consumer index.

Table 5: Feed-in tariffs for electricity generated by photovoltaic systems according to L. 3851/2010

Feed-in Tariff for photovoltaic systems (€/MWh)	Interconnected system		Non-interconnected islands
	>100kW	≤100kW	independently from installed capacity
February 2009	400.00	450.00	450.00
August 2009	400.00	450.00	450.00
February 2010	400.00	450.00	450.00
August 2010	392.04	441.05	441.05
February 2011	372.83	419.43	419.43
August 2011	351.01	394.89	394.89
February 2012	333.81	375.54	375.54
August 2012	314.27	353.55	353.55
February 2013	298.87	336.23	336.23
August 2013	281.38	316.55	316.55
February 2014	268.94	302.56	302.56
August 2014	260.97	293.59	293.59
For each year (n) from 2015 onwards	1.3*ASMP	1.4*ASMP	1.4*ASMP

Recently MEECC, after a public consultation with the relevant stakeholders and authorities, decided to accelerate this decrease rate in view of the recent high rates of cost reduction of the PV installations and the higher efficiencies that enable higher returns on investment.

It should be noted that the relevant decisions (MD Y.A.Π.E. /Φ1/οικ.2262, OG B 97/2012 and MDY.A.Π.E. /Φ1/οικ.2266, OG B 97/2012) have no retroactive effect (i.e. on installations that have already signed a contract for the sale of electricity generation), to ensure the smooth operation of the energy market. The reduction amounts to 12.5% on the currently foreseen price (table 5), according to L.3851/2010 and 7% on the new price per semester henceforth. As regards the deployment of photovoltaics up to 10kW (5kW for the non-interconnected islands) on buildings (also see section 4) and especially roofs (OG B' 1079 /4.6.2009), the feed-in tariff reduction is foreseen to be 5% per semester instead of per year as previously regulated.

In specific table 5a presents the effective FITs for PV systems as from 1stFebruary 2012, taking into account the abovementioned Ministerial Decrees.

Table 5a: Effective from February 2012, the new Feed-in tariffs for electricity generated by photovoltaic systems

Feed-in Tariff for photovoltaic systems (€/MWh)				
	>100kW	≤100kW & non-interconnected islands	On buildings roofs up to 10kW(5kW for non-interconnected islands)	
February 2012	292.08	328.60	495	
August 2012	271.64	305.60	470.25	
February 2013	252.62	284.20	446.73	
August 2013	234.94	264.31	424.40	
February 2014	218.49	245.81	403.18	
August 2014	203.20	228.60	383.02	
For each year (n) from 2015 onwards	1.3*ASMP	1.4*ASMP	February 2015	363.87
			August 2015	345.68

L.3851/2010, moreover, sets the duration of the contract for the sale of the electricity produced to at least 20 years (25 years for CSP stations and PV installations at roof buildings).

The aforementioned feed-in tariffs for the pricing of electricity produced by RES stations, except for PV and CSP stations, are increased by 20% (15% for the case of solid biomass and biogas), if the investment is realized without any public subsidy. Moreover a possibility for setting a higher FIT for the installation of wind farms in areas with lower wind potential is foreseen.

Finally, the possibility for a partial compensation for energy production which curtailed by the Grid Transmission Operator (GTO) is foreseen in the case of wind farms owners.

Table 6, presents the total financial support given in 2009, 2010 and 2011 to RES plants, through the FIT scheme. It is worth mentioning that for years 2010 and 2011 in the non-interconnected islands RES power plants acted beneficially to power generation cost, since the total RES support considering balance from electricity sales was negative.

Table 6: Support schemes for renewable energy

RES support schemes year 2009: Feed-in tariffs	Total payment to RES producers(through the FIT scheme) (M€)	Total RES support considering balance from electricity sales (M€)
Interconnected system		
Wind	154.55	
Small hydro plants	53.16	
Biogas	14.7	
PV	19.94	
Total interconnected system	242.35	110.1
Non-interconnected islands		
Wind	63.45	
Small hydro plants	0.07	
PV	0.67	
Total non-interconnected islands	64.19	3.84
Total RES-E annual support		113.94
RES support schemes year 2010: Feed-in tariffs	Total payment to RES producers (through the FIT scheme) (M€)	Total RES support considering balance from electricity sales (M€)
Interconnected system		
Wind	180.72	
Small hydro plants	65.66	
Biogas	18.49	
PV	57.96	
Total interconnected system	322.83	166.96
Non-interconnected islands		
Wind	64.86	
Small hydro plants	0.04	
PV	12.89	
Total non-interconnected islands	77.8	-7.99
Total RES-E annual support		158.97
RES support schemes year 2011: Feed-in tariffs	Total payment to RES producers(through the FIT scheme) (M€)	Total RES support considering balance from electricity sales (M€)
Interconnected system		
Wind	228.43	
Small hydro plants	50.13	
Biogas	20.16	
PV	193.40	
Total interconnected system	492.12	250.95
Non-interconnected islands		
Wind	71.63	
Small hydro plants	0.07	
PV	56.77	
Total non-interconnected islands	128.48	-5.4
Total RES-E annual support		245.55

Tax reliefs for small RES applications

For small mostly residential RES applications, L.3842/2010 foresees for tax relief on the purchase and installation of RES systems for heating, as well as decentralized RES systems for electricity generation, namely a 10% income tax reduction of the cost of interventions for the energy upgrade of a building that will arise after an energy audit under the provisions of L.3661/2008. These interventions concern, among others:

- a) The purchase and installation of a renewable energy based system for space heating, space cooling and domestic hot water (solar energy systems, heat pumps, biomass boilers, etc.).
- b) The purchase and installation of decentralized power generation systems based on renewable energy (photovoltaic, small wind turbines) and cogeneration of electricity, heating and cooling with natural gas or renewable sources.

The amount of the eligible expenditure for the tax relief is capped to six thousand (6,000) euros.

Also, it should be noted that the revenues from PVs installed in buildings roofs, under the respective national programme, are exempted from tax.

Subsidies on investment

The recently enacted development law (L.3908/2011) constitutes the main instrument for promoting private investment and reflects the current political directions on the content and objectives of the development process of the country.

The existing scheme for private investment support, as introduced by L.3908/2011, includes key criteria of economic efficiency, follows a coherent regional development planning and introduces specific application rules, and it concerns all types of business, from general entrepreneurship, to technological advancement and regional cohesion. The funding is in the form of a subsidy of the total investment cost and ranges from 15% to 50% depending on the region and the size of the enterprise. Especially for RES investments, the maximum subsidy is up to 40% on the initial investment, while photovoltaic plants are not eligible for subsidy under the provisions of this Law.

The NSRF also provides financial support for interventions in buildings of the private and public sector, urban and rural areas and public authorities. These interventions cover, among others, the deployment of renewable energy technologies. Specific programs currently active are:

- The “exoikonomisi kat’oikon” Program that provides grant aid for energy efficiency interventions to domestic buildings, throughout the country. Within the context of the Program, eligible interventions are only those recommended by an Energy Inspector, which include, among others, the installation of a system mainly using a renewable energy source (RES) (e.g. biomass burner, heat pumps, solar-thermal systems, etc.), or a system for the high-efficiency cogeneration of electricity power and heat (CHP).

Furthermore, it includes the installation of solar systems for hot water supply (collector, water tank, mount, pipes, etc.).

- The “Exoikonomo” Program aims at supporting municipalities to introduce a sustainable development plan towards the reduction in energy consumption. It provides a 70% subsidy for energy investments at local level accounting for an overall 100M€ budget. The installation of RES applications is among the eligible actions of the program.
- The “Building the Future – Large Scale Interventions” Program that will last until 2020 and is aimed to achieve 3,100,000 energy interventions in buildings (houses, apartments and commercial buildings). It foresees the installation of 5,000 solar panels and the replacement of 20,000 conventional heating systems with high efficiency ones (RES included) in residential buildings, as well as the installation of high-performance cooling/heating/ventilation systems in 5,000 commercial buildings, including the deployment of RES. The program is based on voluntary basis agreement with the suppliers, who are committed to offer a discount to the energy efficient systems and products that are listed in the programme. The systems/products are listed on the basis of their technical characteristics.
- The “Green Pilot Urban Neighborhood” Program provides for the replacement of systems for heating and cooling with geothermal heat pumps and the installation of other RES applications, such as photovoltaic and solar thermal systems, in residential buildings of low income residents.
- The “Bioclimatic Renewal of Urban Spaces” supports the development of certain architectural and climatic tools that can be directly used for the bioclimatic upgrading of urban spaces and which include the integration of RES technologies.
- The “Green agricultural and island communities – New development model” Program comprises various actions that involve the deployment of RES applications, such as electricity generation plants, RES in buildings, desalination units that use RES, etc., in islands and remote villages.
- The “Pilot bioclimatic school buildings” and “Pilot RES and EE projects on existing public school buildings” fund interventions in school buildings including the installation of RES applications.
- The “Pilot RES and EE projects in public buildings” Program funds, among others, the installation of central solar thermal systems, geothermal and aerothermal heat pumps and other RES systems for heating and cooling in buildings of the public sector

Biodiesel allocation

According to the provisions of L.3054/2002, as amended by L.3769/2009 biofuel quantities are allocated every year, after a relevant call for tenders and an evaluation and allocation procedure, to stakeholders, producers or importers, who are interested in participating in this quota system. Through the evaluation procedure which is based on specific criteria and a specified formula for quota allocation, raw materials like energy crops, agro-industrial by-

products (cottonseed) and wastes (animal fats and used vegetable oils) are approved for biofuel production. According to the relevant Joint Ministerial Decrees (JMD) of the Ministry of Finance, the Ministry of Environment, Energy and Climate Change and the Ministry of Rural Development and Food (see 55 and 57 of Table 2), a specific quantity of pure biodiesel is allocated to beneficiaries in order to achieve the mandatory percentage of biodiesel blended in diesel of 4.5%, increased to 6.5% in January 2010. The JMDs also foresee the maximum premium to be offered by the beneficiaries, which is binding for the beneficiaries' firms sales over the course and for the whole quantity of pure biodiesel for the 2011 allocation period (see also section 8).

Further support actions

The Ministry of Environment, Energy and Climate Change constantly encourages an open dialogue with the relevant stakeholders for the development of a coherent financing support mechanism for RES. In this context, the Ministry recently (end of 2011) invited stakeholders in the field of Renewable Energy to submit their opinions for ensuring the sustainability of the RES financial support mechanism. Towards this direction and after an opinion from RAE, certain measures of temporary nature were identified with an horizon up to 2013, in view of eliminating the current deficit of the special RES-E account. The measures foreseen in favour of the Special RES Account are:

- Imposing an additional charge of 2 €/MWh in the lignite-fired electricity generation.
- Transferring part of the income from the EUAs' auctions in 2011-2012.
- Transferring part of the income from the reciprocal special tax (contribution) on behalf of ERT S.A. (Greek Radio and Television S.A.).

3.1. Information on how supported electricity is allocated to final customers for purposes of Article 3 (6) of Directive 2003/54/EC(Article 22(1)b of Directive 2009/28/EC).

Article 3 (6) of Directive 2003/54/EC was transposed to the Greek legislative framework through L.3426/2005 (Art. 17, Par. 2(h)), which, among others, sets the content of the Code for Electricity Supply. The Code defines the means of providing information to the final consumers by the electricity suppliers regarding the contribution of each energy source to the total electricity mix during the preceding year. It also includes reference to existing reference sources that provide information on the environmental impact, especially regarding the CO₂ emissions.

Furthermore, recently enacted L.4001/2011 includes provisions towards the consumers' protection and the suppliers' commitments. According to Art.48, Par. 2, the Suppliers are obliged to provide the customer with information on the contribution of each energy source to the overall fuel mix of each supplier in the previous year, in an understandable and clearly comparable manner, as well as on environmental impact, regarding at least the CO₂emissions that have been produced by the supplier's overall fuel mix over the preceding year.

4. INFORMATION ON HOW, WHERE APPLICABLE, THE SUPPORT SCHEMES HAVE BEEN STRUCTURED TO TAKE INTO ACCOUNT RES APPLICATIONS THAT GIVE ADDITIONAL BENEFITS, BUT MAY ALSO HAVE HIGHER COSTS, INCLUDING BIOFUELS MADE FROM WASTES, RESIDUES, NON-FOOD CELLULOSIC MATERIAL, AND LIGNO-CELLULOSIC MATERIAL (ARTICLE 22 (1)C OF DIRECTIVE 2009/28/EC).

The Greek regulatory framework in order to set FITs and provide support has considered the higher cost of some RES technologies that may have additional benefits. As mentioned previously, L.3851/2010 foresees higher feed-in tariffs for the electricity generated by RES technologies with co-benefits, namely CSP plants with an embedded storage system, RES hybrid, certain types of biomass and PV on building roofs.

For PVs installed on buildings roofs a favourable FIT is set in order to tap the additional benefits both from the social aspect (increase awareness and acceptability for the photovoltaics at consumers' level) and the energy one (production at demand side, in phase with the peaks in demand). Only residential households and very small businesses are eligible under this specific PV feed-in tariff scheme.

As far as biogas is concerned, favourable feed-in tariffs have been designated, with differentiation, according to the type of biogas used in the power plant, with the highest feed-in tariff set for plants that use biogas produced from animal farming and agricultural residues and waste. L.3851/2010 also provides for a higher feed-in tariff for those CSP plants that include an energy storage system that enables at least two hours of operation at nominal load.

Moreover, considering the advantages of RES hybrid plants, especially for small autonomous systems, along with the different technical and cost related parameters for their development, FIT is determined on a case-by-case basis.

L.3851/2010 also provides for a higher feed-in tariff for those CSP plants that include an energy storage system that enables at least two hours of operation at nominal load.

It is also worth mentioning that L.3851/2010 also includes high FITs for the installation of RES stations on non-interconnected islands, when the cost of connection burdens the owner, taking into account the higher production cost of conventional power stations in these areas.

5. INFORMATION ON THE FUNCTIONING OF THE SYSTEM OF GUARANTEES OF ORIGIN FOR ELECTRICITY AND HEATING AND COOLING FROM RES, AND THE MEASURES TAKEN TO ENSURE RELIABILITY AND PROTECTION AGAINST FRAUD OF THE SYSTEM (ARTICLE 22(1)D OF DIRECTIVE 2009/28/EC).

L.3468/2006 was the first legislative attempt for compliance with the Directive 2004/8/EC regarding the development of the Guarantees of Origin (GoO) system. The introduction of the GoO system in the national energy system became effective as from May 2010 with the introduction of the Ministerial Decree Δ6/φ1/οικ.8786 (OG B 646/14.05.2010). The aforementioned Ministerial Decree specifies the application of the GoO system for electricity produced by RES and high efficiency cogeneration plants and the development of the corresponding quality assurance mechanism.

According to this MD, the GoO is defined as an electronic certificate which is issued by the competent Issuing Body (IB) and certifies that 1 MWh of electricity was produced from RES or high efficiency cogeneration unit for a specific period of time. The Issuing Body (IB) is the Market Operator for the case of units that are located within the area of the interconnected system, PPC for units in the non-interconnected islands and CRES for autonomous stations.

The issuance of a GoO for electricity generated by the corresponding units can be requested for a time period of one year. The GoO certificate must be issued at the latest within 12 months from the expiry date of the production period, to which it corresponds.

For the operation of the GoO system and the quality reassurance mechanism, an electronic registry information system is kept by the respective IB that is responsible for ensuring that the registry is safe and cannot be breached. The electronic registry consists of the Units' Registry and the GoO's Registry. This information system is uniform for all IBs. The specifications are set by TSO and are approved by the Supervising Body (SB), which is the Greek Regulatory Authority of Energy (RAE).

RAE has access to the full electronic records of the registry and is able to proceed to a potential intervention, while the IBs have access only to their electronic records. Market Operator is also responsible for the operation, maintenance and improvement of the aforementioned system. Finally, each IB has the right to control the accuracy of the data provided with inspections, while each participant is required to facilitate this procedure through the smooth provision of the necessary data.

The Market Operator is required to publish statistical data regarding the information that is kept in the electronic registry information system. Table 7 presents the relevant data that refer to the first year of the information system's operation (October 2010 – September 2011, source Hellenic Electricity Market Operator S.A. - LAGIE S.A.).

Table 7: Statistical data of the GoO registry

Issued GoO (MWh)	PV	Wind	Small hydro	Large hydro	Total
Q4/2010			28,000		28,000
Q1/2011			5,500	1,726,916	1,732,416
Q2/2011	8,573	290,942	10,090		309,605
Q3/2011	5,110	11,653	4,846		21,609
Total	13,683	302,595	48,436	1,726,916	2,091,630

Article 25 of recently enacted L.4062/2012 introduces in the national legislative framework specific provisions for the extension of the GoO to heating or cooling produced by RES and for the respective Issuing Bodies.

6. DEVELOPMENTS IN THE PRECEDING 2 YEARS IN THE AVAILABILITY AND USE OF BIOMASS RESOURCES FOR ENERGY PURPOSES (ARTICLE 22(1)G OF DIRECTIVE 2009/28/EC).

Table 8 provides the relevant information for the supply of biomass for the years 2009 and 2010 and presents the data analysed in the various different types and categories of biomass.

Table 8: Biomass supply for energy use

	Amount of domestic raw material (tonnes)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU (tonnes)		Primary energy in amount of imported raw material from EU (ktoe)		Amount of imported raw material from non EU (tonnes)		Primary energy in amount of imported raw material from non EU (ktoe)	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Biomass supply for heating and electricity:												
Direct supply of wood biomass from forests and other wooded land energy generation (fellings etc.)	623,855 (636,708) ³⁷	664,232 (664,382) ³⁷	251	268	159,752	229,823	68	99	1,377	1,821	0.6	0.8
Indirect supply of wood biomass (residues and co-products from wood industry etc.)	72,656	79,831	26	33								
Energy crops (grasses, etc.) and short rotation trees (please specify)												
Agricultural by-products / processed residues and fishery by-products	1,006,750	1,006,032 ³⁸	447	447								
Biomass from waste (municipal, industrial etc. Primary Production of Biogas from landfill and sewage sludge gas)	106,000,000 m ³	91,000,000 m ³	56	49								
Others (please specify) Primary Production	410,000 m ³ (estim.)	1,200,000 m ³	0.21	0.64								

³⁷The figure in the parenthesis concerns the total amount of raw material produced domestically without considering the exported quantity

³⁸ The 2010 quantity is very close to the 2009 quantity due to fluctuations (increases and reductions) of the quantities in the subcategories that constitute the agricultural by-products / processed residues and fishery by-products category (namely exhausted olive cake, kernels and agricultural firewood)

of Biogas from Agricultural industries												
Biomass supply for transport:												
Common arable crops for biofuels (sunflower seeds) ³⁹	Not available	Not available	Not available	Not available								
Energy crops (grasses, etc.) and short rotation trees for biofuels (please specify main types)	0	0										
Others (cottonseeds)	56,138.2	31,031.7	6.1	3.4								

Table 8a. Current domestic agricultural land use for production of crops dedicated to energy production (ha)

Land use	Surface (ha)	
	2009	2010
1. Land used for common arable crops (wheat, sugar beet etc.) and oil seeds (rapeseed, sunflower etc.), <i>main types</i> : sunflower seed, rape seed, soya seed	41,119	71,841
2. Land used for short rotation trees (willows, poplars).	0	0
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum.	0	0

7. INFORMATION ON ANY CHANGES IN COMMODITY PRICES AND LAND USE WITHIN GREECE IN THE PRECEDING 2 YEARS ASSOCIATED WITH INCREASED USE OF BIOMASS AND OTHER FORMS OF ENERGY FROM RENEWABLE SOURCES (*ARTICLE 22(1) H OF DIRECTIVE 2009/28/EC*).

Table 9. Commodity prices (in €/t)

Type of biomass	2008			2009			2010		
	Mean	Standard deviation	Median	Mean	Standard deviation	Median	Mean	Standard deviation	Median
Forest residues (Saw dust, chipsetc.) ⁴⁰	29.04	8.71	29.65	38.59	51.7	26.92	28.87	9.45	28.3
Fire wood (imports) ⁴¹	57	0	57	50	0	50	45	0	45

³⁹ The specific values are not available, however estimations on the amount of raw material and the respective energy content of the produced biodiesel could be extrapolated by the JMDΔ1/A/15555/04.08.2010 where specific productivity indexes are given. According to par. 5 of article 4 of the decision named above, an average theoretical productivity index of 2,650 kg/ha is considered for sunflower seed and rape seed. Moreover, it should be noted that more than 95% of the domestic energy crops refer to sunflower seeds and rape seeds.

⁴⁰ Primary research based on questionnaires conducted by CRES

⁴¹ National Statistical Services (ELSTAT)

Fire wood (primary production) ⁴²	17.07	5.63	17.49	18.07	6.13	18.36	18.07	6.13	18.36
Ricehusks ⁴⁰	6.45	2.66	5.7	21.33	13.32	28	0	0	0
Exhausted olive cakes ⁴⁰	43.54	7.61	42	43.95	8.21	40	48.61	20.22	46.8
Fruit kernels ⁴⁰	45	0	45	50	0	50	75	0	75
Pellets (imports) ⁴¹	268	128	272	206	160	150	249	178	162
Pellets(primary production) ⁴³	180.6	12.9	176.5	197.5	23.54	195	233.7	0	233.7
Sunflower seeds ⁴⁴	17			18			19		

The main commodities used for energy production during the years 2009 and 2010 are saw dust and chips, fire wood, rice husks, exhausted olive cakes, fruit kernels, pellets for heating and sunflower seeds for biodiesel production (Table 9). The prices of forest residues, as recorded in questionnaires sent by CRES to several biomass users, are more or less stable showing, though, a temporary increase in 2009. The same applies to exhausted olive cakes – the temporary increase in prices was noticed in 2010 - and rice husks that are mostly used by the industries to cover their space and process heat. Locally produced firewood remained at the same price whereas imported firewood prices have fallen from 57€/t in 2008 to 45€/t in 2010.

When biomass exploitation investments start, as a consequence of the favorable legal framework for bioenergy production, imports of firewood are expected to rise, while exhausted olive cakes may be exploited locally rather than exported.

The prices of imported pellets fluctuated in the years 2008 to 2010, whereas locally produced pellets showed a tendency increase. However, given that the market is still at its infancy, no conclusion can be drawn from these data, although, it is expected that the local market will be further developed in the coming years, considering the high increase of the oil prices for heating purposes in the domestic sector.

Regarding sunflower prices, seed prices remained almost stable in the decade 2000-2010, ranging from 15-18 €/t. However there were considerable price fluctuations throughout the year.

The impact of biofuels for transport is shown in the area devoted to energy crops (sunflower) as depicted in Table 10 below. After 2005, when the first Law on biofuels was introduced, the agricultural areas growing sunflower have multiplied. Compared to 2005, they doubled in 2006, tripled by 2008 and in 2010 they have increased by almost 15 times higher from the 2005 levels.

Table 10. Area harvested and commodity prices for sunflower seeds⁴⁵

Year	Area (ha)	Prices (€/kg)
2000	28,147	0.15
2001	18,492	0.17
2002	18,074	0.18
2003	8,200	0.16
2004	3,700	0.19
2005	4,560	0.18

⁴² General Secretariat of Forests, Ministry of Environment, Energy and Climate Change

⁴³ Agricultural University of Athens

⁴⁴ Ministry of Rural Development and Food

⁴⁵ Source: Ministry of Rural Development and Food, Ministry of Environment, Energy and Climate Change

2006	10,200	0.18
2007	14,000	0.17
2008	14,702	0.17
2009	41,119	0.18
2010	71,841	0.19

8. DEVELOPMENT AND SHARE OF BIOFUELS MADE FROM WASTES, RESIDUES, NON-FOOD CELLULOSIC MATERIAL, AND LINGO CELLULOSIC MATERIAL (ARTICLE 22(1) I OF DIRECTIVE 2009/28/EC).

Table 11: Production and consumption of Art.21(2) biofuels (ktoe)

Article 21(2) biofuels ⁴⁶	Year 2009	Year 2010
Production – Biodiesel from waste oils	4.97	11.92
Consumption – Biodiesel from waste oils	4.97	11.92
Total production Art.21.2.biofuels	4.97	11.92
Total consumption Art.21.2. biofuels	4.97	11.92
% share of 21.2. fuels from total RES-T	6.35%	9.30%

The only biofuel for transport that is produced and consumed in Greece is biodiesel. The main biodiesel sources are energy crops (sunflower), cottonseed and cottonseed oil as well as cooking oils. The amount of the produced/consumed biodiesel is decided every year according to a quote system.

9. INFORMATION ON THE ESTIMATED IMPACTS OF THE PRODUCTION OF BIOFUELS AND BIOLIQUIDS ON BIODIVERSITY, WATER RESOURCES, WATER QUALITY AND SOIL QUALITY WITHIN YOUR COUNTRY IN THE PRECEDING 2 YEARS (ARTICLE 22 (1) J OF DIRECTIVE 2009/28/EC).

No specific study has been performed to gauge the impact of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within Greece is available at present.

10. ESTIMATION OF THE NET GREENHOUSE GAS EMISSION SAVINGS DUE TO THE USE OF ENERGY FROM RENEWABLE SOURCES (ARTICLE 22 (1) K OF DIRECTIVE 2009/28/EC).

For the calculation of net greenhouse gas emission savings from the use of renewable energy other than solid and gaseous biomass and biofuels (i.e. hydro, wind, PV, solar thermal, geothermal and heat pumps), the methodology used was based on the emission factors that were presented in the national Annual Inventory Report for 2009, submitted under the Convention and the Kyoto Protocol for greenhouse and other gases for the years 1990-2009.

Table 12: Emission factors used to estimated GHG emission savings from the use of renewable energy

⁴⁶Biofuels made from wastes, residues, non-food cellulosic material, and lignocellulosic material.

	CO2 t/TJ	CH4 (kg/TJ)	N2O (kg/TJ)
Electricity and Heat Production			
Liquid Fuels	76.08	3.00	0.60
Solid Fuels	122.79	1.00	1.50
Gaseous Fuels	55.00	1.00	0.10
Manufacturing Industries and Construction			
Liquid Fuels	75.12	1.11	0.88
Solid Fuels	95.15	1.03	1.49
Gaseous Fuels	55.24	1.00	0.66
Other Sectors			
Liquid Fuels	73.07	3.07	5.23
Solid Fuels	96.98	1.00	1.50
Gaseous Fuels	55.24	1.00	0.10
Transport			
Liquid Fuels	71.00	11.37	3.33

The estimation of GHG emissions presented in the aforementioned report was based on the methods described in the IPCC Guidelines, the IPCC Good Practice Guidance, the LULUCF Good Practice Guidance and the CORINAIR methodology. The emission factors used derived from the above-mentioned methodological sources with special attention paid in selecting the emission factors so as to better reflect practices in Greece. Furthermore, emission factors were also obtained from installation specific information contained in EU ETS annual verified submissions.

The methodology used to calculate the net greenhouse gas emission savings from the use of renewable energy, other than solid and gaseous biomass and biofuels, in the current report is as follows.

For the calculation of net GHG saving from the use of renewable electricity (other than solid and gaseous biomass) the shares of coal, oil and gas in electricity in the total consumption of fossil fuels are firstly estimated. The amount of fossil fuels used in the national electricity mix that would produce the same amount of electricity is actually produced by RES is calculated next. The estimated primary energy saved is, then, allocated to each fuel (liquid, solid and gaseous fuels), according to the predefined shares, and is finally multiplied with the aforementioned emission factors.

A similar approach is followed for the estimation of net greenhouse gas emission savings due to the use of renewable energy sources, other than solid and gaseous biomass and biofuels, in heating and transport.

For the calculation of net greenhouse gas emission savings from the use of solid and gaseous biomass and biofuels, the methodology used is as follows.

- For biofuels: In accordance with Article 22(2) of Directive 2009/28/EC.
- For electricity and heat the weighted fossil fuel emission factors are again estimated on the basis of the emission factors for liquid, solid and gaseous fossil fuels (as presented in the national Annual Inventory Report for 2009, submitted under the Convention and the Kyoto Protocol for greenhouse and other gases for the years 1990-2009).

Table 13 presents the estimates for GHG emission savings from the use of renewable energy in 1000t CO₂eq, as estimated according to the approach described above.

Table 13: Estimated GHG emission savings from the use of renewable energy (1000t CO₂eq)

Environmental aspects	2009	2010
<i>Total estimated net GHG emission saving from using renewable energy</i>	11,656	14,595
- Estimated net GHG saving from the use of renewable electricity	8,228	10,859
- Estimated net GHG saving from the use of renewable energy in heating and cooling	3,254	3,460
- Estimated net GHG saving from the use of renewable energy in transport	175	276

11. REPORT ON (FOR THE PRECEDING 2 YEARS) AND ESTIMATION (FOR THE FOLLOWING YEARS UP TO 2020) OF THE EXCESS/DEFICIT PRODUCTION OF ENERGY FROM RENEWABLE SOURCES COMPARED TO THE INDICATIVE TRAJECTORY WHICH COULD BE TRANSFERRED TO/IMPORTED FROM OTHER MEMBER STATES AND/OR THIRD COUNTRIES, AS WELL AS ESTIMATED POTENTIAL FOR JOINT PROJECTS UNTIL 2020 (ARTICLE 22 (1) L, M OF DIRECTIVE 2009/28/EC).

The relevant estimated numbers for excess, which could be used, for transfer to other MS, were given in Table 9 of the Greek NREAP.

The following table 14 presents this projected RES excess for the period 2011-2020 and the actual RES excess for 2010, compared to the table of the RES indicative trajectory prepared in 2009.

Table 14: Actual and estimated excess and/or deficit production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States and/or third countries in Greece (ktoe)

	2010 actual (2010 NREAP estimate)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual/estimated excess production of RES in total gross final energy consumption ⁴⁷	404 (257)	408	513	686	812	856	842	737	743	683	529

11.1. Details of statistical transfers, joint projects and joint support scheme decision rules.

The recently enacted L.4062/3012 transposes the provisions of Directive 2009/28/EC on statistical transfers, joint projects and joint support scheme decision rules to the national legislative framework. Moreover, MEECC has recently announced an initiative under the name “HELIOS”, which aims to utilise the higher solar yields for PVs in Greece and foresees possibilities both for statistical and physical transfer of RES energy produced in Greece to other Member States.

⁴⁷From 2011 and onwards the figures are the estimates presented in the NREAP

12. INFORMATION ON HOW THE SHARE FOR BIODEGRADABLE WASTE IN WASTE USED FOR PRODUCING ENERGY HAS BEEN ESTIMATED, AND WHAT STEPS HAVE BEEN TAKEN TO IMPROVE AND VERIFY SUCH ESTIMATES (ARTICLE 22 (1) N OF DIRECTIVE 2009/28/EC).

The recently enacted L.4062/2012 that has transposed both Directives 2009/28/EC and 2009/30/EC to the national legislative framework, foresees specific provisions for the sustainability criteria for bioliquids and biofuels as well as the procedure for their verification.

Moreover, it should be noted that Greece has already passed legislation for the transcription of Article 22 (3 a-c) of the RES Directive (see section 2.1), that refer to the establishment of dedicated administrative bodies for the licensing procedure, clauses and procedures to respect specific timeframes during licensing and the spatial planning of RES plants into the Greek law.