



RENEWABLE ENERGY POLICY REVIEW

GREECE

Hydropower has traditionally been important in Greece, and the markets for wind energy and active solar thermal systems have grown in recent years. Geothermal heat is also a popular source of energy. Greece has set up a wider range of support mechanism however the market uptake of Renewable Energy Sources (RES) in Greece is lower than expected, mainly due to long licensing and administrative procedures and grid-related issues. The Greek parliament has recently revised the RES policy framework partly to reduce administrative burdens. A new feed in tariff has been set, giving support for 20 years. There is also a particular mention of hybrid systems for the storage of RES produced electricity in the law, mainly in the non-interconnected islands. The solar thermal systems (mainly domestic hot water systems) have been a success story since the 1980s (Greece is one of the EU leaders) but the market is not increasing so rapidly in the recent years. Greek abundant solar energy is very suitable for island, rural, and tourist applications, either as stand-alone solutions or as PV hybrid systems.

KEY FIGURES

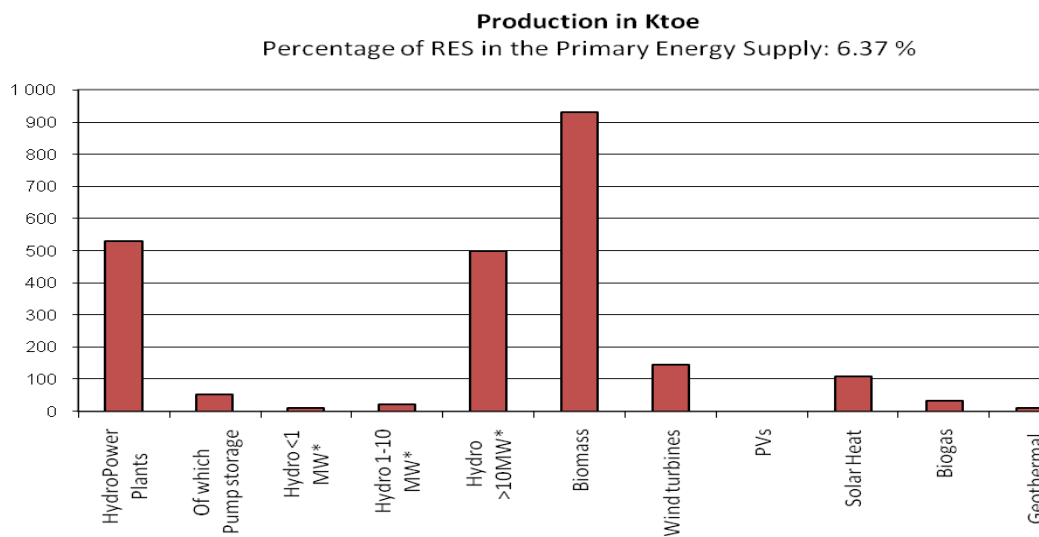
- The **share of RES in primary energy consumption** was of 5.9 % in 2007.¹
- The **share of RES in the gross final energy consumption** was 5.7% in 2006.
- The **share of RES in the gross electricity production** was 12.4% in 2006.
- The **share of biofuels** in the transport sector in 2006 was 0.7%.
- Greece energy dependence on imports amounts to 72 % in 2006.

¹ EurObserver Barometer

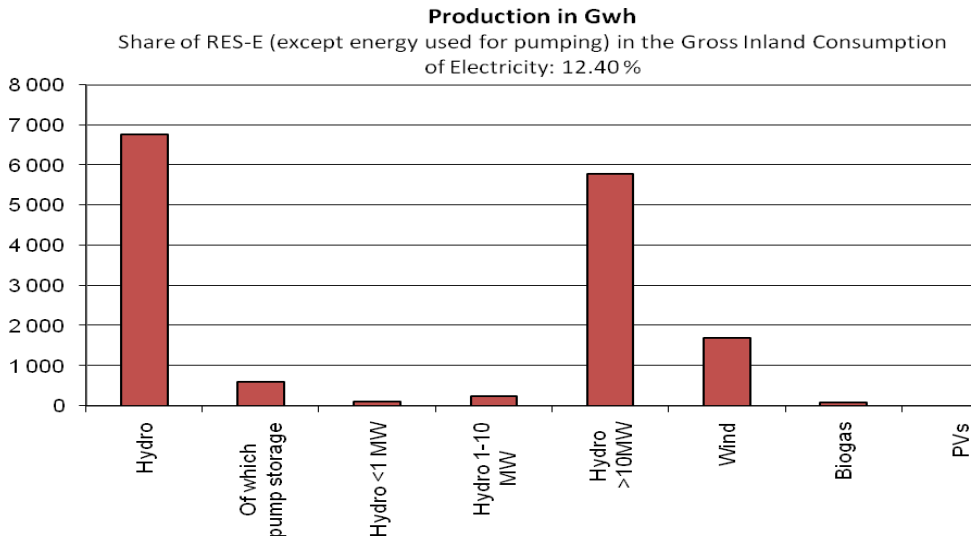
Technology specific figures

- 871 MW of wind power were installed in Greece by 2007, producing 1.847TWh of electricity².
- Hydropower installed capacity reached 3.150 GW in 2007.
- Biomass represents 38.72MW of installed capacity in 2007.
- PV accounts for more than 1.3 MW in 2007.

RES production in 2006



² EurObserver Barometer



Source: CRES

RES POLICY

The Greek parliament revised the RES policy framework partly to reduce administrative burdens on the renewable energy sector. One of the purposes of Law 3468/2006 is just to reduce the bureaucratic licensing procedures for RES-electricity, other than providing with the feed-in tariffs as described below. A particular mention was given in the law to hybrid systems for the storage of RES produced electricity, mainly in the non-interconnected islands. This type of installation receives a power availability tariff on top of the energy tariff.

RES TARGETS

Mandatory targets set by the Directive on the Promotion of the use of energy from renewable sources

- 18 % share of RES on the final consumption of energy in 2020.
- At least 10% share of renewable energy in final consumption of energy in transport by 2020.

Indicative Target set by the RES- electricity European Directive from 2001³

- 21.1 % Share of RES on gross electricity consumption by 2010

³ Directive 2007/71/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market. Currently in force, sets targets up to 2010.

Indicative Target set by the European Biofuels Directive from 2003⁴

- Biofuels consumption of 5.75% of petrol and diesel use for transport in 2010.

National commitments

- The RES-electricity National target to be achieved is 29 % of gross electricity consumption by 2020.
- For biofuels, the following national targets have been set: 0.7% by 2005, 3% by 2007, 4% by 2008, 5% by 2009 and 5.75% by 2010.
- There is no national target/commitment for RES heating and cooling (RES-H&C).
- Intended goal for the expansion of photovoltaic is up to 700MWp by 2020.

RES Technology Roadmap

The RES installation requirements in order to meet the 2010 target for renewable electricity are shown in the following table.

Technologies	Requirements in installed capacity by 2010, in MW	Energy generated in 2010 in TWh	Percentage share of every renewable energy source in 2010
Wind farms	3,648	7.67	10.67
Small hydro	364	1.09	1.52
Largehydro	3,325	4.58	6.37
Biomass	103	0.81	1.13
Geothermal	12	0.10	0.14
Photovoltaics	200	0.20	0.28
Total	7,652	14.45	20.10

Source: 'Fourth National Communication for the penetration of RES-E by 2010 according to the directive 77/2001'

⁴ Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport Currently in force, sets targets up to 2010, with indicative targets by 2005.

Progress towards the Targets

The Share of RES-e in the total electricity consumption was of about 13.92 % in 2006; in 1997 it was 8.6%.

An increase of RES- e is expected in the following years due to:

- The completion of projects that were delayed over the 2001-04 period due to the restructuring of the electricity sector.
- The implementation of regulations which simplified the licensing procedures and set the duration of power purchase agreements for RES-e to 20 years (Law 3468/2006).

So far the growth in RES-e installation has been slower than expected in Greece. Despite a favourable feed in tariff, the long and costly administrative process required to get all the licences needed to develop a RES-e plant and other grid related issues have hindered a further development of RES –e in Greece.

MAIN POLICY INSTRUMENTS

Support for RES electricity

Feed in tariff

The New Renewable Energy Source Act, effective since 27 June 2006 stipulates feed-in rates for renewable and CHP.

<i>Feed-in Tariff</i>					
Resource	Technology	Support level [€cents/ kWh]	Feed-in tariff or premium?	Start year	Duration [years that an investor is entitled to support]
hydro	small	7.3-8.5	feed-in tariff	2006	20years
wind	onshore	7.3-8.5	feed-in tariff	2006	20years
wind	offshore	9	feed in	2006	20years
biomass	solid	7.3-8.5	feed in	2006	20years
biomass	gasification (biogas)	7.3-8.5	feed-in tariff	2006	20years
Solar	PV ⁵	<100kWp: €ct 45,28 /kWh on mainland and €ct 50,28 /kWh on islands >100 kWp: €ct 40,28 /kWh on mainland and €ct 45,28 /kWh	feed-in tariff	2006	20years - and the degression rate will be fixed qnd known for 5 years.

⁵ EPIA

		on islands			
Solar	CSP	23-25	feed-in tariff	2006	20years
geothermal	all	7.3-8.5	feed-in tariff	2006	20years

Source: CRES

A photovoltaic development programme has been setup with a Ministerial decision, on 18/7/2007, in conjunction with the high feed-in tariffs that are foreseen for electricity produced by PVs. According to this plan a total of 540MW_p will be installed in the interconnected system of the Mainland, 200MW_p in the islands and 50MW_p for off-grid applications, over the period 2007-2010. A specific geographical distribution of these installations has been decided (setting upper limits per region) taking in mind the solar radiation distribution over the country and the technical limits set by the now interconnected electricity systems of the islands. About 40% of the target will be covered by small systems (up to 150kWp), in order to have the minimum environmental impact, to reduce the network losses and create local jobs and sources of income.

Simplification of procedures

The main scope of this new law is to simplify the licensing system for the RES investments in Greece (i.e. licensing procedures). According to this new law one point of strong interest is the new electricity feed-in-tariffs system, applicable for the sales of RES produced electricity to the grid. The operators of the electricity grids will be required to connect renewable energy plants to the grid and purchase all of their electricity at legally-fixed minimum prices.

Grid development

Grid availability is an important issue in Greece, since the areas of high wind potential are usually isolated and far from the existing grid infrastructure. Therefore there are regions in mainland Greece where the installation of wind turbine is limited by the existing grids, and also in the islands there are upper technical limits due to the isolated networks. So an important part of achieving the RES target is connected with the grid development projects.

Investment incentives

National Development Law (Law3299/2004) set subsidies that vary from 40- 55% according to region and the type of the enterprise (in case of SMEs and specific regions they can reach up to 55%)

<i>Investment subsidies</i>					
Resource	Technology	Support level [%/total investment]	Start year	End year	Comments
hydro	small	35%	2007	2013	Not all installations are eligible for this subsidy. There is a procedure for applications and assessment
wind	onshore	35%	2007	2013	
wind	offshore	35%	2007	2013	
biomass	solid	35%	2007	2013	
biomass	gasification (biogas)	35%	2007	2013	
PV		30%-45%	2007	2013	

geothermal		35%	2007	2013	
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Support for RES Heating and Cooling

The use of geothermal energy for heating purposes (mainly in greenhouses) has increased considerably over the recent years, mainly due to the introduction of a new law which simplified the procedures for the exploitation of geothermal fields.

Solar water heating systems are used to a large extent in the domestic sector.

Investment incentives

<i>Investment Subsidies</i>			
Resource	Technology	Support level [%/total investment]	Comments
Biomass	Biomass combustion large heat plant	35%	Not all installations are eligible for this subsidy. There is a procedure for applications and assessment
	Biomass combustion large CHP plant	35%	
Geothermal	Geothermal Conventional	35%	

Fiscal Incentives

There is a tax relief system for the installation of domestic hot water solar systems, according to which 20% of the cost of these systems can be deducted from the taxable income.

Support for Biofuels

The obligation of the Biofuels directive has been adopted in the national law. So there is an annual procurement for the supply of the quantity of biofuels that is foreseen by the law which is exempt from fossil fuel tax.

Fiscal Incentives

Biofuels are exempt from the fossil fuel tax which is 24.5€cents/litre

Quota Obligations

There is the commitment of the government for 5.75% biofuels in road transport, but there are no penalties in case of not reaching this share.

Resource	Technology	Quota in % (per year)
Biofuels	free choice	0.7% by 2005

		3% by 2007 4% by 2008, 5% by 2009 5.57% by 2010.
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Annex I. RES installed capacity in 2007

Annex II. Evolution of RES Sources in Greece 1995-2006

Sources:

European Commission Factsheets by Country

http://ec.europa.eu/energy/energy_policy/facts_en.htm

Member States Reports in the framework of the Directive 2001/77/EC on renewable electricity

http://ec.europa.eu/energy/res/legislation/electricity_member_states_en.htm

Member States Reports in the framework of the Directive 2003/30/EC on biofuels

http://ec.europa.eu/energy/res/legislation/biofuels_members_states_en.htm

CRES

www.cres.gr

EurObserv'er Barometer

<http://www.energies-renouvelables.org/observ-er/sig/eufores/sig.asp>



In the framework of the EU co –funded project: RES 2020: Monitoring and Evaluation of the RES Directives implementation in EU27 and policy recommendations to 2020



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Annex I. RES installed capacity in 2007

The following table shows the installed capacity of RES electricity in January 2008, including the large hydropower stations, per region in Greece.

On top of what is shown in the table above, there are installation licenses for RETs for electricity production, totaling 873MW, of which 670 MW are wind parks, 110 MW small hydropower plants, 1 MW photovoltaics and 32 MW biomass power plants. These are projects that are ready to be implemented, without any licensing or grid availability problems and are expected to be in operation by 2010.

Grid availability is an important issue in Greece, since the areas of high wind potential are usually isolated and far from the existing grid infrastructure. Therefore there are region in Mainland Greece where the installation of wind turbine is limited by the existing grids, and also in the islands there are upper technical limits due to the isolated networks. So an important part of achieving the RES target is connected with the grid development projects. At the moment there are in progress three large projects for the upgrade of the electricity grid in Southern Evia, Southeastern Peloponnesus and Eastern Macedonia-Thrace, which are the areas with the highest wind potential in Greece.

Region	Large Hydropower (MW)	Wind (MW)	Small Hydropower (MW)	Photovoltaics (MW)	Biomass (MW)	TOTAL (MW)
Eastern Macedonia & Thrace	500,00	196,67	2,97	0,00	0,00	699,64
Attica	0,00	3,11	0,99	0,10	29,63	33,83
Northern Aegean	0,00	29,90	0,00	0,00	0,00	29,90
Western Greece	907,20	58,15	24,31	0,00	0,00	989,66
Western Macedonia	375,00	0,00	0,00	0,00	0,00	375,00
Central Macedonia	492,00	17,00	34,00	0,40	8,38	551,78
Epirus	543,60	0,00	45,75	0,00	0,00	589,35
Ionian Islands	0,00	40,20	0,00	0,00	0,00	40,20
Thessaly	130,00	17,00	11,43	0,00	0,35	158,78
Crete	0,00	129,50	1,00	0,80	0,36	131,66
Southern Aegean	0,00	37,56	0,00	0,00	0,00	37,56
Peloponnesus	70,00	119,80	2,00	0,00	0,00	191,80
Central Greece	0,00	204,30	24,62	0,00	0,00	228,92
TOTAL	3.017,80	853,19	147,07	1,30*	38,72	4.058,08

*Regarding PVs this is the licensed installed capacity. However there are a lot of small PV system that do not require a license. Based on sales the total installed capacity of PVs was around 5MWp at the beginning of 2008.

Annex II. Evolution of RES Sources in Greece 1995-2006

The use of renewable energy sources, over the last years is presented in the following table.

	ktoe							
Technology	1995	2000	2001	2002	2003	2004	2005	2006
HydroPower Plants	325	354	235	298	459	402	432	530
Of which Pump storage	22	36	54	57	49	46	50	52
Hydro <1 MW*	1	2	3	5	7	8	9	10
Hydro 1-10 MW*	8	12	8	8	15	18	19	22
Hydro >10MW*	295	304	169	228	389	376	404	499
Biomass	897	945	938	948	910	917	957	931
Wind turbines	3	39	65	56	88	96,5	113	145
PVs	0	0	0	0	0	0	0	0,5
Solar Heat	82	99	100	102	105	107	101	109
Biogas	1	1	33	48	36	36	33	33
Geothermal	3	2	2	1	1	9	10	11
Total	1311	1439	1373	1453	1598	1560	1646	1760
Total without pumping	1290	1403	1319	1396	1550	1514	1596	1708
Percentage of RES in the Primary Energy Supply	5.6%	5.2%	4.8%	5.0%	5.3%	5.2%	5.4%	6.37%

The electricity production from RES in particular is presented in the following table.

Evolution of Electricity Production from RES (GWh)									
Technology	1990	1995	2000	2001	2002	2003	2004	2005	2006
Hydro	1997.0	3783.0	4111.0	2725.0	3463.0	5332.0	5205.0	5610.2	6773.8
<i>Of which pump storage</i>	228.0	253.0	418.0	628.0	663.0	566.0	533.0	593.0	610.0
Hydro <1 MW	6.0	7.0	26.0	40.0	58.0	76.0	91.0	105.8	118.0
Hydro 1-10 MW	54.0	89.0	140.0	95.0	92.0	169.0	212.0	218.4	250.0
Hydro >10MW	1709.0	3434.0	3527.0	1962.0	2650.0	4521.0	4369.0	4693.0	5795.8
Wind	2.0	34.0	451.0	756.0	651.0	1021.0	1121.0	1266.4	1691.5
Biogas	0.0	0.0	0.0	72.0	91.0	78.0	93.4	93.8	92.0
PVs	0.1	0.2	0.2	0.2	0.5	0.6	0.8	0.9	1.4
Share of RES-E (except energy used for pumping) in the Gross Inland Consumption of Electricity	5,0%	8,4%	7.7%	5.2%	6.2%	9.7%	9.6%	10.0%	12.4%
Total	1999.1	3817.2	4562.2	3553.2	4205.5	6431.6	6420.2	6971.3	8558.7