Non-cost barriers to renewables – *AEON* study

National report Greece

Client: DG TREN

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1 Introduction

Greece is in general lagging behind on its goals for the contribution of Renewable Energy Sources (RES) for 2020. Until then, Greece needs to have RES contributing by 18% in its total energy used (and the Greek government has promised a 20% contribution), translating into a RES contribution in electricity of 35%, while in 2006 the overall contribution was 5.5% (FET, 2010). The main part of this contribution is expected to be from wind energy, followed by hydropower, solar (photovoltaic) and then by geothermal, while biomass is expected to play a very small role overall.

Greece has a significant potential of **wind**, **solar** and **geothermal** energy. With 300 sunny and warm days a year, over 1,000 islands with sea wind, an average wind speed exceeding 7.5 m/s and an important number of geothermal fields. Greece is an ideal country for wind, solar and geothermal energy production (Sakellaridis, 2008). There is also hydro in Greece, but the potential for increasing this share is not very large.

The new Ministry of Environment, Energy and Climate Change, created with the new government taking over after the elections of October 2009, drafted a new law on renewable energy. The industry hopes that this will improve the permitting process by creating a **one-stop shop** and forcing the relevant authorities to strict deadlines. But some of the stakeholders interviewed, even though considered this new law certainly an improvement, they expressed doubt on whether it would in practice shorten and improve the permitting procedure. Also, the feed-in tariffs (FITs) for wind will be lowered in this law, possibly leading to a slower growth of RES. Moreover, frequent changes in the legal framework also increase uncertainty for private investors.

Table 1 shows the RES targets for 2010, whereas Table 2 shows the breakdown of installed capacity and generation in 2006. Table 3 shows the generation by source for 2007-2009.

Table 1.1 RES installation requirements to meet the 2010 target

RE source	Installed capacity (MW)	Electricity generation (TWh)	Contribution to target (%)
Wind energy	3,648	7.67	10.67
Small hydro	364	1.09	1.52
Large hydro	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: MoD, 2007.

Table 1.2 Installed capacity and electricity generation in Greece in 2006

Fuel	Installed Capacity	Net Generation	Mainland System	Crete	Rhodes	Other islands
	MW	(GWh)	(GWh)	(GWh)	(GWh)	(GWh)
Wind	752	1,683	1,199	348	24	112
Biomass	31	66	65	1	-	-
Hydroelectric	3,135	6,484	6,484	0	-	-
Natural gas	2,518	10,169	10,169	-	-	-
Oil Products	2,317	8,045	3,309	2,472	674	1,590
Lignite	5,288	29,165	29,165	-	-	-
CHP	243	983	983	-	-	-
Total	**14,283**	**56,595**	**51,374**	**2,821**	**698**	**1,702**

Source: MoD, 2008.

Table 1.3 Electricity generation in Greece in the period 2007-2009

	Hydro	Wind	RES other	Thermal	RES share
2007	4489	1333	178	46455	11.4%
2008	4496	1662	216	45519	12.3%
2009	5999	1909	371	41231	16.7%

Source: ENTSO-E, 2010.

Interestingly, 2009 turned out to be a particularly wet year and the total RES produced amounted to 16.7% of which hydro contributed with 12.1% far beyond the expected amount for hydro, but still short of the set target for total RES.

By end 2009 the installed capacity of **wind** in Greece amounted to 1,087 MW marking a 13% increase from 2008 which is a slow down as compared to previous years and places Greece 12th among the countries with wind installed capacity in the EU[1]. This capacity consists solely of onshore wind. According to interviews, the capacity factor of wind on the mainland varies between 20-40%, whereas it is higher on the islands with 40-60% capacity factors.

In 2009 there was 45 MW installed capacity of **PV** in mainland Greece (none on the islands yet), and the projection for 2010 is at least 100 MW. There are applications for another 4,000 MW under consideration. In a low scenario where the Greek PV market will continue to grow at the current rate the installed PV power in 2020 is projected to amount to 2500 MW. However, in a more favourable growth scenario the share of PV electricity generation would reach 12% or 6500 MW installed capacity in 2020.

Currently there is no **geothermal** energy used for the production of electricity in Greece. This RES is in the national plan for the goals of 2020. The household sector though is not expected to represent any potential due to high costs and space needed. In 2009, the areas with high geothermal potential have been mapped in order to clarify priority areas. Most

[1] http://en.wikipedia.org/wiki/Installed_wind_power_capacity.

of geothermal energy is used for heating and especially in greenhouses and fish plantations. According to MoD (2008), there is a technical potential for geothermal energy in Greece as 104 MW_e and 1,022 MW_{th}.

Hydropower is one of the most important RES in Greece, even though most of hydropower projects are larger projects including a dam. Nevertheless this still is the biggest contributor to RES in Greece. Small hydropower projects are also in the national plan for 2020.

Pumped-storage hydroelectric plants could be used in combination with a wind park to smoothen the generated output. There is currently one in Ikaria with 8 MW installed capacity.

Biomass is not as popular in Greece as other RES technologies. This is because the potential of the country in terms of biomass are not as high (limited amount of agricultural residuals, and mainly concentrated in one area). In the countryside biomass is used in the form of burning wood etc for heating purposes, but pellet heaters are not popular in Greece and are entirely forbidden in the two biggest urban areas, Athens and Thessaloniki. The goal for biomass for 2020 is lower than the one for geothermal energy.

There are 19 companies which currently participate in adding **biofuels** to normal fuels in Greece through a percentage that is set every year with a ministerial decision. There are two types of decisions every year. First an invitation is sent to the companies that produce biofuels in order to participate in the yearly allocation of percentage of biofuel from each company and second there is the decision on the actual allocation. The invitation for 2010 has been issued, but the allocation decision is still pending for 2010, leading to protests from the association representing the companies that produce biofuels (ESPAV).

The conditions in Greece are more favourable to bioethanol than biodiesel, but as of today there is no production of bioethanol in Greece. The Sugar Industry has made business plans to convert some of its plants into bioethanol production, but they have not yet implemented these.

1.1.1 Non-cost barriers

The major barriers indicated for Greece from the stakeholder interviews were the following:

- Main issue is **bureaucracy – authorisation delays**. Administrative procedures are complicated and cumbersome with many authorities involved, while officials in each authority might interpret the law in their own way, or not respect the deadlines set by law due to other internal guidelines;
- The **electricity grid** is very congested in areas with high RES potential in Greece, which does not allow for further development of projects there. Moreover, many of the Greek islands are not connected to the main grid, which excludes them regardless of their potential from big RES projects;
- For **wind energy**, **geothermal** and to a lesser extent for **biomass**, there is strong local (or NGO related) opposition that can considerably delay a project. Anyone can appeal

against to a project without sanctions if their objection proves baseless. The main source of local protests/resistance is the lack of coordinated communication and awareness raising concerning RES by the state;

- For **off-shore wind** mainly the great depth of the Aegean Sea makes it difficult and expensive to build and develop an offshore wind park (this technology is not yet mature). In addition a grid connection would be costly in the major part of the islands in the Aegean Sea, due to the long distance from the grid.

1.1.2 Main regulations

In Greece, the legal framework around RES is extended and spanning through many different laws and ministry decisions related to them. A list of the main laws during the last years is as follows:

- Law 2244/94, regarding revisions on the electricity production code from RES, and the implementing Ministerial Decision 8295/95, which broke new ground for the promotion of RES in Greece. This law remained in force only until the end of 2000, when it was replaced by the law 2773/99 for which it still acts as reference;
- Law 2773/99 regarding the liberalisation of the electricity market in Greece. Key features include:
  - priority to the electricity produced from RES to cover the demand of electricity;
  - a ten year contract to the producers of electricity from RES at a price which will be 90% of the existing medium voltage tariff, at maximum, for the energy produced.
- Development law 2601/98, replacing 1892/90, which was the main funding tool of RES applications;
- Law 2941/2001 regarding the simplification of procedures for establishing companies, licensing Renewable Energy Sources plants, etc.;
- Law 3017/2002 related to the ratification of the Kyoto Protocol to the UNFCCC;
- Law 3299/2004 on promotion of investment. Subsidies 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%) (www.elke.gr is the official site of the Hellenic Centre for Investment). Support on capital cost (up to 40%) for biodiesel plants was included in the 3rd Community Support Framework (Energy), which ended last year. The 4th Framework is under development and respective provisions are expected to be put forth;
- The Biofuels directive 2003/30 has been adopted by the Greek government late 2005, as law 3423/2005. According to this, biodiesel will be the main biofuel for the Greek transport sector with bioethanol playing a less important role until 2008. The amount of biodiesel required to satisfy the indicative target of 2% (on a lower calorific basis) for the year 2006 has been estimated to be circa 80.000 tonnes while the amount to satisfy the indicative target of 5.75% for the year 2010 has been estimated to be c. 148.000 tonnes;
- The Directive 2001/77 on electricity from RES has been adopted by the Greek government in June 2005, as Law 3468/06. According to this, a target of 20.1% RES contribution incl. large-scale hydro on electricity production in 2010 has been set. The main scope of this new law is to simplify the permitting system for the RES investments in Greece (i.e. licensing procedures). A point of strong interest is the new

electricity feed-in-tariffs system, applicable for the sales of RES-produced electricity to the grid. Electricity produced by biomass is set at 73 euro/MWh;
- Joint Ministerial Decrees 54409/2623(27/12/2004) ruling the Emissions Trading schemes;
- Specific Spatial Planning Framework and Sustainable Development for RES. According to this plan, for biomass and biogas exploitation, favourable areas are considered these located in near proximity to agricultural lands where biomass is produced, waste treatment plants, food industries, animal breading farms. Minimum distances from the nearby land uses are set. The plan is under public consultation.

In the coming weeks, a new law is expected to come in place. This law is expected to change the landscape regarding many issues. One-stop shopping is expected to be established in the permitting process simplifying it and many current issues regarding timelines and processes are expected to be solved. The new law is expected to increase the feed in tariff for biomass to attract investors.

1.1.3 Main authorities

The public authorities mainly involved with RES in Greece are:
- Ministry of Environment, Energy and Climate Change;
- CRES (Centre of Renewable Energy Sources) – national advisor on RES and research centre;
- RAE (Regulatory Authority of Electricity) – the main permitting body;
- DESMHE (TSO) – responsible for the connected grid (excluding non- connected islands);
- DEH (main DSO) – the Public Electricity Company of Greece is the main DSO and the sole responsible for many of the non – connected to main grid islands;
- DEI (PPC) – Public Power Corporation S.A.– PPC owns 93% of the installed power capacity in Greece, generated by lignite, fuel oil, hydroelectric and natural gas power plants, as well as by aeolic and solar energy parks.

1.1.4 Sources

This report is mainly based on interviews, namely with the following organisations:
1. Hellas RES – Association of Producers of Electricity from RES;
2. Helapco – Hellenic Association of Photovoltaics;
3. EBHE- Solar Thermal Association;
4. ELETAEN – Hellenic Wind Energy Association;
5. Ecodomima – Private company;
6. Rokas Group – Private company;
7. CRES – Centre of Renewable Energy Sources (main RES agent in Greece);
8. BP Solar – private multinational company;
9. HACHP – Helenic Association for the Cogeneration of Heat & Power;
10. IGME – Institute of Geology and Mineral exploration;
11. ITA – Group of Companies – International Technological Applications – Private company;

12. ADELF WIND LTD – Private company;
13. Aid Engineering ltd. – Private company;
14. IENE – Institute of Energy for South East Europe;
15. E3Mlab-NTUA – E3M-Lab Institute of Communication and Computer Systems – National Technical University of Athens;
16. EPU-NTUA – Energy Policy Unit, National Technical University of Athens.

2 Issue 1 Administrative Procedures

2.1 Introduction

The permitting process is one of the biggest barriers in regards to RES in Greece. The permitting procedure is complicated, including around 20 different authorities and sub-permits, whereas it used to be around 40.[2] The main 3 permitting steps include:

- Production Permit;
- Installation Permit;
- Function Permit.

In addition, mainly for applications of installations over 10 MW_e,[3] like wind, geothermal, hydro, and PV parks there is a need for an Environmental Impact Assessment (EIA) report, connection to the grid, power purchase agreement (PPA), land acquisition permission, but also a building, installation and operation licenses are needed.

Small projects (under < 20 kW) are entirely excluded from the production permit while small to medium projects (20 – 50 kW) can get an exemption from the production permit by requesting for it from RAE. The exemption is often granted within 10 days.

2.2 Description of barriers & solutions

2.2.1 Detailed description of the barriers and solutions

Barrier 1.1 – Inefficient general administrative procedures (including no/insufficient specific rules for building integrated/small scale RES installations)

The relevant laws about the procedures as well as the feed-in tariffs and regulations are changing often, creating problems with the long-term planning of big investors.

Moreover, parts of old laws are often being included and excluded from the main law, which makes it particularly difficult to interpret the law at any given time. In addition, there is a tendency in Greece to see energy separate from environment. For instance, the PPC has a lobby against RES in Greece. This may change with the new president, who has a history in wind generation.

[2] For the detailed permitting procedure in each step refer to (in Greek): http://www.desmie.gr/content/index.asp?parent_id=44&cat_id=1403&page_id=2340&lang=1.

[3] See http://www.ypan.gr/docs/Decision_2000-2002.pdf

Barrier 1.2 – Inexistent or insufficient spatial planning

With the opening of the market for photovoltaic systems to connect to the electricity grid in 2007 and by including a subsidy for the investment as well as a very appealing feed-in tariff, around 6,500 applications (close to 4,000 MW) for permits for photovoltaic systems have been done with RAE, the Regulatory Authority of Electricity in Greece. Since this was far the available permits, RAE has put the applications on hold. Recently, monthly applications of about three years ago are being reviewed. This leads to a considerable delay in the development of PV in Greece, where licence applications of three years ago are newly being evaluated.

In addition, due to attractive subsidy and FITs many speculators have been attracted to this particular market, creating difficulties for serious investors. The application process has been blocked and some cases appeared where traders after acquiring a permit would offer there to real investors for extremely high prices. The industry association has asked for a removal of the subsidy part for the investment to avoid such cases.

Barrier 1.3 – Competing public interests

No barriers detected.

Barrier 1.4 – Other Barriers

Administrative procedures in Greece can lead to a number of other barriers. These are presented below for wind, geothermal and biomass.

Concerning wind parks the estimates for the length of administrative procedures varies widely among the people interviewed:

- The administrative procedure in the case of wind parks and including appeals can take 5-7 years.
- In Greece, even after completing all required studies, it could still take 3 years before commencing the investment.
- Under “normal” circumstances, this is 18-24 months.

The procedure of exploiting geothermal energy has two steps.

- The first includes a tender given for the research of an area. However, tenders are not being held, even though the 13 regional governments would earn royalties on the geothermal fields.[4]
- Then a second separate tender has to be issued for the exploitation of an area that is of high potential. As the costs involved in the research are extremely high and there is no guarantee that the second tender will go to the same source, many investors are discouraged from exploration, so that suspected high potential areas are not exploited in Greece.

As this technology is not yet very popular in Greece, it will not be easy to attract investors without consistent and proper communication. Moreover, Greek authorities have been considering the geothermal fields as part of national property (and security) blocking the way towards attracting especially foreign investors.

[4] Step one has been done only once in the last 5 years. In the tendering process the right for exploitation went to a local municipality as a political favour.

Concerning biomass the following three barriers were detected:

- A system of waste collection is needed, because the waste flows from olive farms, wood and agriculture are not yet managed. There is also a strong farmer's lobby, which can resist changes towards waste management, also by negotiating a (high) price. Here still opportunities exist for entrepreneurs who can organise these waste flows. There is one isolated example, where the waste flows of 500 ktonnes of olive farm residuals would be delivered to the planned installation with no transport costs. However, this project failed due to lack of finance.
- If penalties for improper waste disposal would be enforced, which they are not, industrial factories would have an incentive to give their waste away for biomass (or biogas) production. During the interviews the following example was given. A small biogas producer was using animal residuals in order to produce biogas. Initially, he was collecting animal residuals himself, but after a while, farmers have started asking for money for these animal residuals. As it was not profitable anymore, he had to stop his biogas production. If penalties were enforced, farmers would have had an incentive to dispose of animal residuals; even for free.
- Even though this study mainly deals with non-cost barriers, biomass is not developed in Greece, mainly due to low FIT. The new law proposes a FIT of 150 €/MWh for biomass power plants between 1 to 5 MW, and even 200 €/MWh for biomass power plants smaller than 1 MW. For biogas FITs of 200 €/MWh for power plants above 1 MW and 220 €/MWh for power plants below 1 MW is on the agenda.

2.2.2 Best Practice Elements and Indicators

One stakeholder referred to the situation in the US. There it is a one-stop shop; once the project is shown and known to be economically feasible and a network connection is possible, there should be no further blockage. This procedure could be completed within a month.

The new law on RES that is currently under discussion in Greece is also aiming at a one-stop shop and this could shorten authorisation delays.

No.	Technology	Benchmark	Result
1.1		Is one stop-shopping possible?	No
1.2		Amount of money to be invested in the administrative process (including cost of work and costs like fees) (in €)	NA
1.3		Time to be spent for the administrative process (duration to get all the main permits) (in months)	36-48 months
1.4		Estimated number of permits required (#)	15-20

3 Issue 2 Technical Specifications (for support)

3.1 Introduction

In general, EU specifications are accepted overall (and required when needed). The only extra step needed is that CRES needs to check the PV project after installation to make sure it is made according to the specifications declared, but this is not considered to be a barrier.

3.2 Description of possible barriers & solutions

Barrier 2.1 – Weak definitions
No knowledge of such barrier.

Barrier 2.2 – no EU standards applied
This issue minimally exists only for solar thermal water boilers, as Solar Key Mark is accepted but not required.

There is no certification for drillers to geothermal yet, while needed according to the EU Directive. Moreover, there is a lack of training for installers of heat pumps.

Barrier 2.3 – Specified locations for testing and/or certification
No barriers detected.

Barrier 2.4 – Barriers to trade
No barriers detected.

Barrier 2.4 – Other Barriers
No other barriers detected.

3.2.1 Best Practice Elements and Indicators

No.	Benchmark	Result
1	Are specifications expressed in terms of European standards (including eco-labels, energy labels and other technical reference systems), though such European references exist?	Yes

4 Issue 3 Building integrated technologies

4.1 Introduction

For Greece, the most important RES within the build environment are the use of solar panels (photovoltaic systems) and solar water heaters. The use of pellet stoves and micro CHP is not widespread, whereas heat pumps are upcoming in Greece in the last 5 years.

PV is also upcoming in Greece, with an estimated installed capacity of 100 MW in 2010, but this is mainly as PV parks, whereas the penetration in buildings as rooftop PV panels is rather limited.

The only types of solar-thermal technology in use in Greece are solar thermal water boilers. Their use is very popular for the last 20 years in Greece (when an incentive scheme for solar boilers was introduced) and they do not require any kind of permitting process (which might change in the future by adding one easy and small permit from the Urban Development department which is now only needed in new houses). No barriers have been identified from the stakeholder perspective on this sector.

The use of ground source heat pumps is rapidly upcoming in Greece. There are 300 installations up to now, with varying capacities between 15–1000 kW_{th}, also known as shallow geothermal systems. The house size in Greece is between 150–600 m^2 and on average 220 m^2, needing a pump size of 18–25 kW in Greece. In 2004, a new regulation came out to make it easier to construct heat pumps in houses. Furthermore, a new regulation in 2014 will no longer allow for ordinary heaters, but will make either CHP or heat pumps compulsory for new houses. However, geothermal (40-90^oC) direct usage is generally applied to greenhouses and some fish farms and for drying agricultural products.

4.2 Description of barriers & solutions

4.2.1 Detailed description of the Barriers and solutions

Barrier 3.1 – Inefficient general administrative procedures
No barriers detected. For instance, for small PV (<10 kW) only a permit from the Construction Ministry is needed. This can be arranged quickly in a few days and has no problem of paper works.

Barrier 3.2 – No/insufficient specific rules for building integrated/small scale RES installations

A micro CHP of 4 kW needs many licenses which are difficult to get. Micro CHP has heat as the main output, where electricity is a by-product. The main reason is the fear of a negative reading on the meter, and consequently procedures become lengthy and difficult.

The main barrier for promotion of PV in buildings is the lack of agreement on metering standards. It will take at least another 6 months before meter standards will be decided upon. In this situation, excess generation of electricity cannot yet be sold back to the grid, making it economically less attractive to install a rooftop PV panel.

Barrier 3.3 – Competing public interests

There is a competition between solar heaters and gas boilers, where often gas boilers are being promoted.

There is great potential for energy efficiency in Greek buildings, but it is being promoted in the wrong way. It is seen as a business rather than driven by environmental friendliness. Previously there was no communication between Ministry of Energy and Ministry of Environment.

Barrier 3.4 – Renewables obligations insufficient

No barriers detected. There are no renewables obligations in Greece.

Barrier 3.5 – Exemplary role of public buildings neglected

This is indeed a barrier in Greece as in most cases, public authorities do not know or do not care about the implementation of RES in their buildings. As implementation of RES is obligatory for now only in new buildings, the idea that public buildings could serve as an example for building integrated RES is not used by integrating RES technologies to the already built public offices.

Barrier 3.6 – RES deployment hindered by spatial planning matters

No barriers detected.

Barrier 3.7 – Tenancy law and ownership law impedes development of Building Integrated RES technologies

No barriers detected.

Barrier 3.8 – Other Barriers

Not applicable.

4.2.2 Best practice elements and indicators

The best practice needed in Greece is to set a meter standard for measuring small-scale local electricity generation, to make these investments in buildings economically attractive.

No.	Benchmark	Result
1	Is this installation type in normal cases exempted from an authorization procedure (building permit)?	Yes for small rooftop PV
2	Are legal-administrative requirements inadequate for this installation type?	No
3	Is there a Renewables Obligation that operates sufficiently?	NA
4	Number of administrations that must be contacted	1-3

5 Issue 4 – Promotion of energy efficient renewable energy equipment

5.1 Introduction

The requirements of Art 13 (6) of the Directive concerning the promotion of efficient bioheat and heat pumps are fulfilled.

5.2 Description of barriers & solutions

5.2.1 Detailed description of the Barriers and solutions

Barrier 4.1 – Non-compliant promotion schemes
No barriers detected.

Barrier 4.2 – Lack of substitution of existing inefficient systems
No barriers detected.

Barrier 4.3 – Use of national procedures
No barriers detected.

Barrier 4.4 – Insufficient information
No barriers detected.

Barrier 4.5 – Other Barriers
No barriers detected.

5.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
4.1	Are the requirements of Art 13 (6) of the Directive concerning the promotion of efficient bioheat and heat pumps fulfilled? (yes/no)	Yes

6 Issue 5 Information/awareness raising

6.1 Introduction

In contrast to wind, photovoltaic systems rarely face with protests by local communities and NGOs. PV, which is a rather new technology in Greece, has tangible benefits in the local community, e.g. work positions opened, and there is no negative publicity, but , relevant stakeholders do not cross out such a possibility in the future.

For small hydroelectricity projects, the administrative process is specific and it includes the municipalities involved (as the water usage usually belongs to them so they need to give permit for its exploitation) so local protests are rare.

6.2 Description of barriers & solutions

6.2.1 Detailed description of the Barriers and solutions

Barrier 5.1 – Insufficient availability of information on support measures & of guidance for planners and architects
Information and awareness has not been consistently raised with households. Instead investors for large PV parks and speculators are attracted and to qualify for attractive FIT and subsidies, where large PV parks have generally lower capital costs. A requirement of 25% equity by local banks has been another reason why domestic investors could not be attracted.

Moreover the legal framework is quite loose (even though existing) when it comes to penalties to industrial factories for not disposing their waste properly.

Barrier 5.2 – Insufficient public funding for campaigns/programmes
There are no consistent campaigns or programmes in place for RES.

Barrier 5.3 – Insufficient campaign-/programme-design
Not relevant (see 5.2).

Barrier 5.4 - Other barriers
Protests by the local community as well as from specific NGOs such as the bird association cause delays and in some case cancellations to **wind energy** projects. This is often fuelled by misinformation and unsubstantial rumours. However, as a result many wind sites with good potential are substantially delayed in their development. In addition, the archaeological council often does not approve and tourist interests can be another

cause for opposition. There should not be any wind power plants in within a wide range of dedicated areas for the military, archaeology, tourism and nature parks. Once protests go to court, cases can be pending for 5-10 years. Besides wind, local people also protest against transmission lines, which face similar restrictions as wind projects.

In the early 1980s a pilot 2MW **geothermal power** plant has been constructed in Milos, an Island in the Aegean Sea. During this experiment H_2S was emitted, which can cause negative health effects and has a bad smell. The operation was stopped and this experience has led to a great antipathy against geothermal power generation, which has blocked the further development until today. This shows the difficulty to reverse a negative perception in Greece, where one incident of 30 years ago is still of influence today.

Biogas created from waste treatment has traditionally met with severe objections from local populations (mainly due to sanitary issues as well as odor, noise and destruction of the environment). There are two cases, one in Kalamata and one in northern Greece (Kilkis) in which the residents opposed as they believed a biogas production unit would pose danger to the health of the local community, will have bad odor and could harm the environment and especially the water of the area. The project in the north was entirely cancelled due to that reason. This opposition is mainly due to lack of knowledge and because Greeks associate biogas with waste management which nobody wants in their backyard.

6.2.2 Best Practice Elements and Indicators

Local protest can be deterred with a fair and well-informed information campaign, demonstrating to the local people the benefits of RES.

No.	Benchmark	Result
1	Is sufficient information on support measures available?	Average

7 Issue 6 Certification of installers

7.1 Introduction

A distinction can be made between certification for installers and the need for certifications of the product itself. A certification for installers with regard to renewable energy on the initiative of the government does not exist in Greece.

The only thing asked in terms of specification is an engineer with a diploma from an accredited university to be able to supervise RES projects.

7.2 Description of barriers & solutions

7.2.1 Detailed description of the Barriers and solutions

Barrier 6.1 – Lack of a certification body
Presently no official certification body (or bodies) is in place.

Barrier 6.2 - Lack of guidelines
The installers of any RES type do not need to be certified, therefore there are no guidelines for this certificate. Installers are appointed by the installing companies and this is the main quality assurance for the installers to deliver quality in their work. Some respondents have indicated that they train their installers themselves to the new technologies they are using.

Barrier 6.3 - Lack of training
Installers have had an educational background as training for their work, and get additional internal trainings provided by installing companies if the nature of the work or RES product calls for this. There are no governmentally driven training campaigns.

Barrier 6.4 - Other barriers
Not applicable.

7.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
6.1	Are certification schemes or equivalent qualification schemes available for installers?	No
6.2	Is sufficient training on RES provided during the standard education curriculum of installers?	No

8 Issue 7 Infrastructure Development

8.1 Introduction

On of the main barriers towards RES deployment is the need for grid infrastructure development. As stated in the introduction to this report, the electricity grid is very congested in areas with high RES potential in Greece, which does not allow for further development of projects there. Moreover, many of the Greek islands are not connected to the main grid, which excludes them regardless of their potential from big RES projects.

8.2 Description of barriers & solutions

8.2.1 Detailed description of the Barriers and solutions

Barrier 7.1 - Problems concerning development of electricity network infrastructures according to a long-term strategy

PPC had an agreement for grid extension, but failed via a bureaucratic decision based on one omission in the tender and the process which can take easily 5 years was cancelled. There is the fear among investors that once the wind licence is granted, no grid access will remain.

The TSO does not have sufficient view on transmission extension. Moreover, expropriation and land acquisition rules for new transmission connections takes years.

Barrier 7.2 - Problems concerning grid expansion processes of existing electricity networks

In areas with high **wind energy** potential the electric grid is often congested, e.g. EVIA Island, which already has 400 MW wind in place. There is no electric grid connection to many of the islands in the Aegean Sea, where the wind potential is the largest and where there is not sufficient local demand to consume the generated wind energy. In EVIA there are some pending wind applications that are blocking new wind application concerning grid access. This congestion in the grid on paper, as the congestion occurs in the grid accessing procedure. EVIA upgrade is planned to be realised in 2013.

There are two high temperature (> 200 ^{o}C) fields on two isolated Greek islands, namely Milos and Misiros. A total of 70 MW **geothermal power** plants could be constructed here. However, this is far beyond the local demand and there is no connection to grid to transmit this potential generation and also for that reason (in addition to local myths that geothermal has negative health effects) these fields are not being developed.

Barrier 7.3 - Problems concerning development of a Trans-European Electricity Network
No barriers detected.

8.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
7.1	Wind onshore	Presence of an efficient (in terms of capability of achieving its stated objectives) plan for the reinforcement of the interconnection capacity with neighbouring countries.	No
7.2	Wind onshore	Presence of an efficient plan for the reinforcement of the connection capacity within the country.	No

9 Issue 8 Power Grid Issues

9.1 Introduction

Proximity to the grid is not a big issue for PV, because it is mainly connected to the low voltage distribution grid, which has a good coverage. In some add-hoc cases sudden high voltage fluctuations (flicker) has been observed, this can be quite destructive.

9.2 Description of the barrier

9.2.1 Detailed description of the Barriers and solutions

Barrier 8.1 - Problems concerning grid connection
No barriers detected.

Barrier 8.2 - Problems concerning grid access
Small PV < 10 kW only needs licence on Construction Ministry and this takes only a few days, very fast no problem of paper works. However, the bottleneck is related to meters, because the meter standard is not yet decided. Then the produced electricity cannot yet be fed into the distribution grid.

Barrier 8.3 (former barrier 9) - Problems concerning TSOs and DSOs
No barriers detected.

Barrier 8.4 – Other Barriers
Not applicable.

9.2.2 Best Practice Elements and Indicators

The grid is not always a problem in Greece. There are locations with good wind potential at the mainland as well, where the existing grid could easily absorb more RES.

No.	Technology	Benchmark	Result
8.1		Are the rules on cost sharing and bearing of grid connection objective, transparent and non-discriminatory ?	No
8.2		Is the denial of grid connection by TSOs and DSOs a common problem, constituting an important barrier for RES development?	No
8.3		Number of months for getting grid connection (considering also approval of grid connection)	NA
8.4		Estimated connection costs in Euros (in case producer pays)	NA

10 Issue 9 Gas Network Issues

10.1 Introduction

Natural gas is not one of the main sources of energy for Greece. The gas network does not reach a large part of the country and most households are abstaining from its use as their infrastructure does not allow the use of gas. There is no green gas in Greece.

Biogas created from waste treatment has traditionally met with severe objections from local populations (mainly due to sanitary issues as well as odor, noise and destruction of the environment). There are two cases, one in Kalamata and one in northern Greece (Kilkis) in which the residents opposed as they believed a biogas production unit would pose danger to the health of the local community, will have bad odor and could harm the environment and especially the water of the area. The project in the north was entirely cancelled due to that reason. This opposition is mainly due to lack of knowledge and because Greeks associate biogas with waste management which nobody wants in their backyard.

The FIT for biogas production is currently the same as for wind energy: 87.84 €/MWh on the mainland and 99.44 €/MWh on the isolated islands. In the new law, under discussion, this is proposed to be increased to a FITs of 200 €/MWh for power plants above 1 MW and 220 €/MWh for power plants below 1 MW.

The biogas potential is estimated at 350 MW by Zafiris (2007), whereas Batzias *et al.* (2005) estimates a potential of 424 million m^3; both estimates are based on nearly the same amount of manure that can be produced in Greece. These estimates can also be confirmed by MoD (2008, table 2.5.4). The produced biogas could also be purified and then mixed into the existing natural gas network, but this is not yet practiced in Greece.

10.2 Description of barriers & solutions

10.2.1 Detailed description of the barriers and solutions

Barrier 9.1 – No encouragement for upgrading
Not applicable.

Barrier 9.2 - Lack of information
Not applicable.

Barrier 9.3 - Inefficient authorisation procedures
Not applicable.

Barrier 9.4 – Lack of incentives for infrastructure owners to open to biogas
Not applicable.

Barrier 9.5 - Other barriers
Not applicable.

10.2.2 Best practice elements and indicators

No.	Benchmark	Result
9.1	If green certificates and/or subsidies for biogas are in place, do they de facto make unattractive to feed green gas into the grid due to the high level of subsidy for biogas used for electricity generation?	NA
9.2	Are the costs of grid connection for producers of gas from renewable energy sources objective, transparent and non-discriminatory?	NA
9.3	Do transmission and distribution tariffs discriminate against gas from renewable energy sources?	NA
9.4	Average time needed for grid connection approval (from application for grid connection to formal approval) in months (#).	NA

11 Issue 10 District Heating

11.1 Introduction

District heating is not very popular in Greece and only present at a small scale limited to only four cities in the North of the country supplied by PPC, covering less than 5% of total heat demand in Greece.[5] The estimated number of connected residents is 124,959.[6] Most heat networks are fuelled by coal and coal products, with a smaller share of natural gas (close to 10%) and oil products (around 1%). At present renewables are not used to generate heat for the district heating network in Greece. There is no district cooling in Greece, for which there would be a considerable demand, especially during hot summers in the south.

11.2 Description of barriers & solutions

11.2.1 Detailed description of the Barriers and solutions

Barrier 10.1 – Lack of positive conditions for the increase of the share of renewables in existing DHC systems

Given the relatively short network length with 658 km and low level of installed capacity of 445 MW_{th} of the district heating systems in operation in Greece, this barrier is not very important.

The district heating systems are mainly fed by residual heat of coal power generation, with no contribution from biomass. One of the main reasons for this are concerns about the biomass supply chain. Even though Greece possesses biomass resources, there is no tradition in the large scale use of biomass. There are also concerns about the certainty, where the quality and the reliability of biomass supply are seen as a serious barrier to investments in the burning equipment.

Barrier 10.2 –Lack of positive conditions for the initiation and expansion of DH systems largely based on renewables

The popularity of biomass in Greece is rather low. This is because the potential of the country in terms of biomass are limited to agricultural residuals, and are mainly concentrated in one area.

[5] In comparison, the total heat delivered is about 10% of the amount in the Netherlands.

[6] District Heating and Cooling (Euroheat & Power 2009), http://www.euroheat.org/Greece-79.aspx

11.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
10.1	Are there policies to promote the increase of the RES share in existing DH networks?	No
10.2	Are there policies to promote the initiation / expansion of DH networks?	No
10.3	Percentage present renewable share (see ECOHEATTOOL)	0%
10.4	Percentage CHP share (idem)	100%

11.3 References

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