

Non-cost barriers to renewables – *AEON* study

Portugal

Final report

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1 Introduction

This document represents the contribution of Golder Associates Portugal (GAPT) for the “Non-cost barriers to renewables – AEON study” and, as such, focuses on the Portuguese situation concerning those barriers.

The information provided in this document is mainly based on the preliminary version of the “Roteiro Nacional das Energias Renováveis; Aplicação da Directiva 2009/28/CE” (Portuguese Renewable Energy Source Industry Roadmap) report, prepared by the Portuguese Association for Renewable Energy (APREN) in the framework of the European project REPAP 2020. This report was made available to GAPT on the 4th March 2010 and previously a meeting was held with APREN technical department to discuss the relevant aspects of the roadmap document and of the barriers identified and discussed in it.

The reasons for using the above mentioned report as the main basis for the present document are the following:

- The methodology adopted by APREN included the creation of 8 working groups (for Wind, Hydro, Solar – Electricity; Wave, Biomass – Electricity, Transport, Heating and Cooling and Geothermal) in which a total of more than 40 stakeholders had a direct participation.
- The APREN report covered the barriers (cost and non-cost) in a systematic way, reflecting the perspectives of such a relevant panel of stakeholders; it was therefore considered not justifiable to go back to those stakeholders and discuss the same subjects already reflected in the APREN report.

Additionally to the consideration of this important source of information, interviews with a limited number of stakeholders were held. These stakeholders included representatives of two companies that develop and install RES systems (one more focused in solar micro generation systems), the other more experienced in biomass, and a representative of a consultancy business that acts in the RES and carbon economy areas.

The considerations along this document do also reflect the understanding of GAPT about the different issues in discussion.

2 Summary of barriers identified

The sections below present a summary of the barriers identified in Portuguese Renewable Energy Source Industry Roadmap report prepared by APREN. This summary reflects the interpretation and translation by GAPT of the opinions expressed by APREN.

2.1 Electricity

In Portugal, the most relevant barriers associated with the administrative procedures have to do with permitting processes.

In general terms, the situation is characterized by heavy administrative procedures, not always clear and which deadlines are, more often, not observed, resulting in costs overrunning and even the abandonment of some projects.

The definition of clear deadlines for all the administrative steps is regarded as very important.

Also, the creation of an electronic platform where all the permitting process could be monitored could be very beneficial.

Typically, there are several different entities involved, implying the need to liaise with those entities in parallel. Additionally, most of times these entities do not exchange information between themselves. The implementation of a one-stop shop is regarded as potentially very beneficial.

The compatibility of the RES projects and the spatial planning instruments is also noted as a relevant barrier. This happens with different spatial planning instrument (examples: municipal master plans or forest planning code).

The municipalities do not have specific deadlines to review their master plan, many of which are outdated and do not consider RES projects. The process to update these municipal master plans is itself very heavy and time consuming.

A practical situation is mentioned in regard of the requirement for the transmission lines connecting the RES projects to the grid having to be already considered in the spatial planning instruments (while this is not required for the grid transmission lines).

It is reported that difficulties have been raised by the National Forest Authority in accepting RES projects (namely wind farms) in areas classified as forest areas.

In Portugal, there is a regulation that seriously limit construction in areas that suffered forest fires (this was implemented to prevent man-caused fires with the objective of facilitating new urban developments). As a direct consequence, some RES projects proposed for areas that suffered fires have experienced problems in the approval, as the investigations on the causes of the fires are still being carried out and the process to cancel the construction prohibition is slow.

Another implication relating to the forest fires has to do with the prohibition of construction in areas classified as having high and very high fire risk and this has also caused problems in the approval of RES projects, although these projects can have a positive role in keeping those areas under a better surveillance and in creating accesses that otherwise would not exist.

The Environmental Impact Assessment (EIA) processes have also been noted as an obstacle for the development of RES, in particular in what concerns the time that is consumed in these processes. The lack of consideration of the economic impact of the projects is also questioned.

APREN mentions that the legal requirements applicable to the electricity sector only are spread across more than 350 legislative documents, which gives a clear idea of the complication. Updating and compiling all the legislative documents into a workable framework is therefore seen as very important. Currently, technical matters are dealt with not only in regulations but also in governmental laws and this is seen as non-efficient.

The grid capacity is mentioned as representing an important barrier, as it difficult the obtaining of connection points. The lack of connection between Portugal and Spain and between Spain and France are also taken as a problem, having as ultimate consequence the impossibility of continuous export of electricity for Europe and the adoption of the flexibility measures considered in the Directive.

It is essential to assure that the grid expansion is done considering not only population density but also the RES resources. The investment planning for the expansion of the grid has taken this into account but there is not a formal / official characterization at the country level of the RES potential that could be used as a guide for this purpose.

Another difficulty has to do with the requirement for right-of-way of the transmission lines connecting the projects with the grid (being that the entities that manage the grid have access to different procedures that make this more easy). The question is then of the RES project can have the same status of the grid infrastructures for purposes of right-of-way concerning the accesses to the facilities and for the transmission lines connecting to the grid.

APREN considers that the current rules for the allocation of new connections to the grid is a barrier, in the sense that there are too many requests (many of which are of speculative nature) submitted to the permitting entity, which has then difficulties in evaluating those requests in a reasonable time. Some improvements are also noted as needed, aimed at a more equal and transparent treatment of all RES promoters.

It is also reported that although in general there is a positive attitude towards the renewable, there is the risk of an increasing pressure against RES projects by local populations and some environmentalist NGOs. It is therefore important to improve the public perception of the Res, which can be achieved by a communication campaign explaining all the economic, environmental and social aspects involved. A specific reference has made concerning a better explanation to the public of the renewable energies tariffs structure and justification.

Specifically for Wind:

- It is considered that there is a limitation of the available areas onshore to implement the projects needed to comply with the set objectives of installed capacity by 2020. This may imply the installation of projects in areas with less potential or in areas with protection status. In some cases it may involve implementing projects closer to populations with the inevitable NIMBY risk. Grid issues are also involved;
- As for offshore, the potential must be enough for the 500 MW foreseen. However, some obstacle are identified, namely in what concerns the configuration of the continental platform along the Portuguese coast. The time for the construction of submarine cables and the lack of experience (in technical aspects but also in permitting) is also noted.

Specifically for Hydro:

- The main barrier identified is that the concession periods for the small hydro are too short (in APREN view it should be of 50 years minimum);
- It is anticipated that by 2020 there will be an excess of capacity, expressed specially in the periods of low consumption during the winter when there the wind farms are producing. This means that consideration should be made about using hydro pumping in these situations (associating wind farms to small hydro).

Specifically for Solar:

- The main barrier for the centralized production is mentioned as being the lack of information about the solar radiation in Portugal. The data currently available do not cover the direct radiation and are based in statistics obtained in the 1970-80 decade, which some specialists consider that present lower values than normal. This lack of information is regarded as critical for the planning of new investments and to control the production in existing installations;
- The main barrier for the microgeneration is considered to be the electronic platform used to manage the new requests and that has been not capable to cope with the demand, causing the system to malfunction and not allowing most of the registry attempts. The fact that currently the registry is cost-free means that too many applications are made without the real intent to be implemented on the short-term (and therefore preventing others to get into the system);
- The current situation does not assure that the certification standards imposed by the Directive are being considered;
- It also noted that the separation between micro and mini-generation could be very beneficial.

Specifically for waves:

- The fact that the technology is not mature is regarded as the main barrier;
- The creation of a pilot zone is noted as an absolute priority for the development of this technology, placing Portugal in a leading position;
- The characterization of the resource with an adequate level of detail is regarded as necessary to identify potentially interesting areas. This can be done in conjunction with characterization studies for offshore wind;
- As mentioned for the offshore wind, the lack of experience (in permitting, construction and maintenance) is an obvious difficulty to be overtaken.

Specifically for biomass:

- The sustainable availability of the resource re is a severe barrier. There are various estimates of the usable potential of biomass in Portugal but it is perceived that some investment decisions are being taken without a proper consideration of the effective available quantities;
- It is relevant to note that a large proportion of the biomass market is concentrated in a small number of players, especially those more closely related with the paper pulp industry;
- The biomass market is considered as being not a mature market, requiring development of new solutions for the harvesting, transformation and transport of biomass;
- There is the risk of competition between use of biomass as RES and forest-based industries, which are very important in Portugal (approximately. 10% of the country exports). This risk must be eliminated, by the promotion of integrated forest operations (wood + biomass) and the increase of biomass alternative sources;
- The possibility of co-firing of biomass and coal in coal-fired power plants is regarded as questionable;
- It is also reported that the existence of an open market and the current status of integration and harmonization of policies within Europe puts an additional pressure on the biomass quantities available in Portugal – export of biomass for countries with more attractive tariffs.

Specifically for geothermal:

- The use of geothermal energy for the production of electricity is currently being done in the Portuguese islands (Azores, namely, in volcanic environment) where no relevant barriers are noted;
- The Stimulated Geothermal Systems (SGS) are regarded as potentially viable but a barrier is noted: the geothermal gradient in Portugal has not properly studied yet;
- It is also noted that the permitting process for the production of electricity from geothermal energy follows permitting process which is quite different from the one applicable to other RES and this difficult its implementation;
- Another identified barrier is the absence of insurance to cover the geological risk associated to this type of projects. The fact that in Portugal there is not an industry of the geothermal sector and not even an industry of the oil sector (upstream) from which experience the geothermal could benefit implies that such industry has to be created from scratch.

2.2 Heating and cooling

It is considered that the heating and cooling sector has been quite neglected in what concerns the promotion of the incorporation of RES.

Given the mild climate of Portugal and despite the abundance of resources, Portugal has been paying little attention to this sector, and the situation is quite different from what happens specially in Northern Europe.

The use of RES technologies (namely solar) for water heating is starting to increase but it is considered that measures to promote the use of RES for acclimatisation inside the buildings are needed to have carbon neutral buildings. This is true for new buildings but even more so for existing constructions.

The main barrier for the use of RES in heating and cooling is the absence of heating and cooling infrastructures additional to the natural gas and electricity networks. This lack limits any generalized use of RES for heating and cooling.

All over Portugal there are only 2 examples of district heating and neither of these use RES.

As in the electricity sector, also here there is a lot of dispersed legislation, which difficult all the procedures and the interpretation of the requirements, executing small projects and a global vision of the sector.

In general, the following barriers are identified as required:

- There is a general lack of information and formal training (and certification, except for solar thermal) about the use of RES for heating and cooling;
- The national effort in terms of R&D can also be regarded as a barrier;
- There is no legal requirement for the new buildings or new urban development to have an infrastructure for water heated by a combination of RES;
- As mentioned before, the legal requirements are dispersed and in most cases the technical issues are mixed with higher-level matters, making all the interpretation and implementation more difficult and time-consuming;
- There is no obligation for large buildings to be acclimatised with a certain percentage of energy from RES; such an obligation would have a very relevant effect.

Specifically for solar:

- The solar energy is the one that has been more promoted for use in heating and cooling. The challenge may be in using solar energy for other uses than just heating sanitary waters, in particular acclimatisation and industrial processes;
- One current barrier is that the existing requirements for new buildings is to have 1 m² of solar collector per person but does not specify a requirement for the energy effectively delivered; being so, the efficiency and quality of the installed systems is not promoted.

Specifically for biomass:

- Biomass was once the only resource for heating. With electrification and domestic use of gas these sources became predominant. There are tax issues (relating to VAT) that do not encourage the use of biomass;
- As mentioned before about the use of biomass for electricity production, the availability of the resource is a strong barrier;
- Currently the domestic market for biomass (for instance of pellets; note that about 90% of the pellets produced in Portugal are exported) has a small dimension and there are not much incentives to make it grow;
- In this current situation, the dimension of the market is itself a barrier.

Specifically for Geothermal:

- Portugal has good conditions for the use of low-enthalpy geothermal systems but the effective potential and the types of heat-pumps better suited for each situation still require a better investigation;
- The need for regulations that simplify the permitting procedures of geothermal heat-pumps has been identified.

2.3 Transport

The main barrier identified for the use of RES in transport has to do with the current legal framework and market regulation mechanisms, that will not allow complying with the goals set by the RES Directive and by the Fuel Quality Directive.

One of the problems has to do with the allowed percentage of bio-diesel allowed to be incorporated in the diesel fuel, leading to an estimated total incorporation of only 4,5%, in comparison to the 10% goal. It is therefore urgent to define a clear regulatory framework to allow the necessary investments to be made, namely in 2nd generation technologies and in efficient logistics.

New legal conditions for the introduction of new bio-fuels as well as incentives for the investment and incorporation of 2nd generation technologies, more efficient and eco-friendly are regarded as needed.

There is an incentive system in place that has implication of the taxes on biofuels, which has created special conditions to some biodiesel producers (covering a total of 350 000 ton/year). This incentive system is regarded as not completely transparent and generated quite some controversy in the market.

Another identified barrier has to do with the absence of sustainability certification of the bio-fuels, which should take into account the respective carbon foot-print.

3 Issue 1 Administrative Procedures

3.1 Introduction

3.2 Description of barriers & solutions

3.2.1 Detailed description of the Barriers and solutions

In Portugal the most relevant barriers associated with the administrative procedures have to do with permitting processes.

In general terms, the situation is characterized by heavy administrative procedures, not always clear and which deadlines are, more often, not observed, resulting in costs overrunning and even the abandonment of some projects.

The definition of clear deadlines for all the administrative steps is regarded as very important.

Also, the creation of an electronic platform where all the permitting process could be monitored could be very beneficial.

Typically, there are several different entities involved, implying the need to liaise with those entities in parallel. Additionally, most of times these entities do not exchange information between themselves. The implementation of a one-stop shop is regarded as potentially very beneficial.

The situation regarding microgeneration is somehow different, as the initiative, “Renováveis na Hora” (see <http://www.renovaveisnagora.pt>) introduced significant simplification to the permitting process. However, the registration process is still mentioned as being problematic, and a change of the rules is expected in the second half of 2010.

The compatibility of the RES projects and the spatial planning instruments is also noted as a relevant barrier. This happens with different spatial planning instrument (examples: municipal master plans or forest planning code).

The municipalities do not have specific deadlines to review their master plans, many of which are outdated and do not consider RES projects. The process to update these municipal master plans is itself very heavy and time consuming.

A practical situation is mentioned in regard of the requirement for the transmission lines connecting the RES projects to the grid having to be already considered in the spatial planning instruments (while this is not required for the grid transmission lines).

It is reported that difficulties have been raised by the National Forest Authority in accepting RES projects (namely wind farms) in areas classified as forest areas.

In Portugal there is a regulation that seriously limit construction in areas that suffered forest fires (this was implemented to prevent man-caused fires with the objective of facilitating new urban development). As a direct consequence, some RES projects proposed for areas that suffered fires have experienced problems in the approval, as the investigations on the causes of the fires are still being carried out and the process to cancel the construction prohibition is slow.

Another implication relating to the forest fires has to do with the prohibition of construction in areas classified as having high and very high fire risk and this has also caused problems in the approval of RES projects, although these projects can have a positive role in keeping those areas under a better surveillance and in creating accesses that otherwise would not exist.

The Environmental Impact Assessment (EIA) processes have also been noted as an obstacle for the development of RES, in particular in what concerns the time that is consumed in these processes. The lack of consideration of the economic impact of the projects is also questioned.

APREN mentions that the legal requirements applicable to the electricity sector only are spread across more than 350 legislative documents, which gives a clear idea of the complication. Updating and compiling all the legislative documents into a workable framework is therefore seen as very important. Currently, technical matters are dealt with not only in regulations but also in governmental laws and this is seen as non-efficient.

3.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
1.1	All	Is one stop-shopping possible?	No (1)
1.2	All	Amount of money to be invested in the administrative process (including cost of work and costs like fees) (in €)	> 20 k€ (est.) (2)
1.3	All	Time to be spent for the administrative process (duration to get all the main permits) (in months)	> 24 (3)
1.4	All	Estimated number of permits required (#)	> 6 (1)

1. Yes for micro generation;
2. k€for micro generation (average estimation);
3. For micro generation it can be much less, but there are practical examples of even longer times;
4. 1 for micro generation.

4 Issue 2 Technical Specifications

4.1 Description of barriers & solutions

In Portugal, the technical specifications are established basically for solar thermal equipment only, using for that the national CERIF or the Solar Keymark schemes.

For this specific technology the situation is quite clear and no major barriers are identified. However, for the other technologies the situation is vague.

Barrier 2.1 – Weak definitions

Technical specifications which must be met by renewable energy equipment and systems in order to benefit from support schemes are **not clearly defined**.

Barrier 2.2 – no EU standards applied

These specifications **are not expressed in terms of European standards** (including eco-labels, energy labels and other technical reference systems), though such European references exist.

Barrier 2.3 – Specified locations

These specifications prescribe, explicitly or de facto, where the equipment and systems are to be certified, for instance because that specific certification is de facto only available in that specific country.

Barrier 2.4 – Barriers to trade

These specifications impede in any other way the operation of the internal market.

4.1.1 Best Practice Elements and Indicators

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

5 Issue 3 Building integrated technologies

5.1 Introduction

5.2 Description of barriers & solutions

5.2.1 Detailed description of the Barriers and solutions

Building integrated technologies have a marginal expression nowadays in Portugal and the number of examples do not allow very robust conclusions.

However, it is possible to note that apart from inefficient general administrative procedures, there are no specific rules for building integrated/small scale RES installations. Renewables obligations are insufficient and until now and the public buildings have not been used as demonstrative examples.

Future developments on this can be restrained from competing public interests and associated spatial planning matters and this may require specific provisions.

Probably the greatest challenge will be to make use of urban regeneration projects (very much needed in major cities like Lisbon and Oporto) to make use of building integrated technologies on pre-existing buildings.

The considerations regarding this issue are not based on the APREN roadmap.

Barrier 3.1 – Inefficient general administrative procedures

In general, the administrative procedures for building integrated RES technologies are inefficient. However, for solar thermal (see <http://www.aguaquentesolar.com>) and micro generation (see <http://www.renovaveisnadora.pt>) the situation is somehow different and for micro generation one-stop-shop is possible.

For projects above the micro generation scale, however, this is no longer possible. In these cases, long lead times, obstacles and, in general, lack of clarity can be expected.

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

Probably the most pertinent comment about this barrier is that there are specific rules for micro generation, as mentioned above, but not for larger scale projects.

For some RES (shallow geothermal installations, for instance) there are no specific rules.

Barrier 3.3 – Competing public interests

The existence of competing public interests with the development of building integrated RES have not caused major barriers known so far.

However, there is the potential for that to happen, namely in the case of historic buildings or in the framework of urban regeneration projects involving historic centres of certain cities. While there are rules for the preservation of the architectonic characteristics of buildings (or areas) there are no rules or guidelines defining under what conditions renewable can be integrated into those buildings or areas.

Barrier 3.4 – Renewables obligations insufficient

The currently existing ROs are only focused on solar thermal for new buildings and, for other buildings where micro generation projects are implemented, to have access to better tariff. The existence of the solar panels for new buildings makes part of the energy efficiency certificate that the buildings must have in order to be transacted (sold or rented).

These regulations apply at national level. To note that these RO are expressed in the format of a minimum area of solar panels and not in terms of its capacity.

The law that establishes the obligation for the new buildings having solar panels is the Decree-Law 80/2006 (*Decreto-Lei 80/2006, de 4 de Abril, Regulamento das Características de Comportamento Térmico dos Edifícios - RCCTE*). The law that establishes a better tariff for micro generation if there are also solar thermal panels installed is the Decree-Law 363/2007 (*Decreto-Lei n.º 363/2007 de 2 de Novembro*).

Barrier 3.5 – Exemplary role of public buildings neglected

Public buildings do not fulfil their exemplary role concerning the integration of RES in buildings in a satisfying way, as there have been a very limited number of public buildings where RES systems have been implemented and the visibility of these few examples have been very small.

Barrier 3.6 – RES deployment hindered by spatial planning matters

As it will be mentioned about Issue 10, district heating (and cooling) has, in practice, no expression in Portugal and therefore RES in DHC expression.

In a more generic view, RES are typically not taken into account in a sufficient way for spatial planning, even if solar orientation and, in general, energy efficiency passive measures are becoming more and more a standard practice (and ultimately subjected to certification, under the energy efficiency certification scheme). However, there is clearly insufficient guidance (and regulation) on the consideration of RES for spatial planning available for the relevant actors.

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

Tenancy in Portugal is less expressive than in most of the European countries, as most of the people live in their own houses. However, for office buildings and old residential buildings typically tenancy is more important.

Taking the regulations on micro generation, there is no direct mention of any difference between tenancy or ownership. It is mentioned, however that the energy producer has to be the same person (or entity) mentioned in the electricity supply contract (and this can be either the tenant or the owner).

5.2.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
3.1	All	Is this installation type in normal cases exempted from an authorization procedure (building permit)?	Yes (No for existing buildings, if it changes the façade of exterior aspect of buildings)
3.2	All	Are legal-administrative requirements adequate for this installation type?	No
3.3	All	Number of administrations that must be contacted (#)	2

6 Issue 4 – Promotion of energy efficient renewable energy equipment

6.1 Description of barriers & solutions

6.1.1 Detailed description of the Barriers and solutions

Currently there are no energy efficiency labels, certificates or standards in place in Portugal for biomass or heat pumps and, in fact, the use of biomass or heat pumps associated with RES is very limited.

Apart from the lack of information, there are no objective incentives to promote the use of energy efficient renewable energy equipment.

These considerations regarding this issue are not based on the APREN roadmap.

6.1.2 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)	No

7 Issue 5 Information/awareness raising

7.1 Description of barriers & solutions

Detailed description of the Barriers and solutions

Apart from solar thermal systems and photovoltaic systems (micro generation), there are no obvious support measures in place.

For solar thermal (see <http://www.aguaquentesolar.com>) and micro generation (see <http://www.renovaveisnadora.pt>), efforts have been made to spread the information related to existing support measures.

However, in general it is considered that there is a general lack of information about the use of final-user-oriented technologies, and in most cases, the existing information is too technical and not oriented to the public in general.

It is expectable that the creation of new support measures will trigger new information campaigns and these must be directed / specified to the different targets (something that has not happened until now).

7.1.1 Best Practice Elements and Indicators

No.	Benchmark	Result
5.1	Is sufficient information on support measures available?	Yes, for the existing measures (solar thermal)

8 Issue 6 Certification

8.1 Description of barriers & solutions

8.1.1 Detailed description of the Barriers and solutions

Currently, only solar thermal installers are subject to certification by an accredited training programme or training provider.

This obviously represents a barrier and requires some action, probably using (and improving) the experience available from the solar thermal installers.

In fact, there is an appointed and acknowledged national certification scheme and an appointed and acknowledged national certification body (*DGEG – Direcção Geral de Geologia e Geologia*), but that only applies to solar thermal.

Currently there are no guidelines for planners, architects and other responsible for planning and design available and neither there is support for certification courses for planners, architects and other responsible for planning and design.

8.1.2 Best Practice Elements and Indicators

No.	Benchmark	Result
6.1	Are certification schemes or equivalent qualification schemes available for installers?	Yes (solar thermal only; others No)
6.2	Is sufficient training on RES provided during the standard education curriculum of installers?	Yes (solar thermal only; others No)

9 Issue 7 Infrastructure Development

9.1 Description of barriers & solutions

9.1.1 Detailed description of the Barriers and solutions

The grid capacity is mentioned as representing an important barrier, as it hinders the obtaining of connection points. The lack of connection between Portugal and Spain and between Spain and France are also taken as a problem, having as ultimate consequence the impossibility of continuous export of electricity for Europe and the adoption of the flexibility measures considered in the Directive.

It is essential to assure that the grid expansion is done considering not only population density but also the RES resources. The investment planning for the expansion of the grid has taken this into account but there is not a formal / official characterization at the country level of the RES potential that could be used as a guide for this purpose.

REN (the Portuguese TSO) has developed the Development and Investment Plan for the Transport Grid 2009 - 2014 (2019)¹, in which the above mentioned issues were addressed. This plan is currently under implementation and therefore the beneficial results are not yet in place.

Looking at the Entsoe report (European Network of Transmission System Operators for Electricity, TEN-YEAR NETWORK DEVELOPMENT PLAN 2010-2020, draft for calculation), for the midterm in the Continental South West Europe, the main investment need is the development of the interconnections and the accommodation of the existing internal networks to those new projects. Taking into account the fact that the Iberian Peninsula is almost an electric island with only four tie-lines (2 of 220 kV and 2 of 400 kV) between France and Spain, the last one having been built in 1982, and that they face continuous congestions. Therefore, France and Spain have the shared goal to increase their transfer capacities. The objective is to reach a short-term capacity of 2800 MW, and 4000 MW in the long term. On the other hand, also Portugal and Spain have the objective to increase their NTC up to 3000 MW in order to avoid current congestions and thus facilitating the functioning of the Iberian Electricity Market (MIBEL).

The connection and evacuation of renewable sources, mainly wind, hydro and solar in the Iberian Peninsula, is one of the most important investment needs in the region. The ambitious renewable plans in Spain and Portugal need an important investment in transmission infrastructure. One reason is that new wind farms are usually located in

¹ REN. Plano de Desenvolvimento e Investimento da Rede de Transporte 2009 – 2014 (2019); Feb. 2008.

areas without existent connection, or with a poor connection, to the transmission network (such as the North-East *Trás-os-Montes* area and the inland middle *Beiras* region in Portugal). On the other hand, the production of this new generation plants induces new flows that need to be accommodated in the electric system, which was designed for different flows.

Nevertheless, conventional generation evacuation is also another driver, mainly in areas with a big attraction as a production site: *Lavos* and *Sines* in Portugal are examples of potentially congested areas due to conventional generation if nothing is done (some of those areas are already experiencing congestion).

For the long term, the main identified investment need in the CSW Region is also the development of the interconnections, mainly France-Spain. Some congestion is still expected on this border even after commissioning the planned project in Eastern Pyrenees. An interconnection capacity up to 4 GW could be needed in the long term. Improving the quality of supply, and generation evacuation are expected to be also important investment needs, for example in the North for Portugal where there are plans of new large hydro and wind plants.

However, for the long term, there is still a big uncertainty and therefore TSOs need more information regarding 2020 objectives and generation installation projects in order to be able to give more accurate details. During 2010 new national development plans will be launched in the countries of the region and after the analysis updated information will be available.

In Portugal, the main flows will go from internal areas to Lisbon and also flows from Spain are expected in the North while the South of Portugal will export to Spain.

In summary and yet according to Entsoe, the connection and evacuation of renewable sources, mainly wind, hydro and solar in the Iberian Peninsula, is one of the most important investment needs in the South-Western and Centre-South region of Europe. The ambitious renewable plans in Italy, Spain and Portugal necessitate an important investment in transmission infrastructure. One reason is that new wind power plants are usually located in areas with weak or nonexistent connection to the transmission network. On the other hand, the production of these new generation plants results in new power flows that need to be accommodated in the electric system, which was designed for different power flows. It triggers not only internal reinforcements but also emphasises the need to increase the interconnection capacity with the rest of the continent and especially with France.

In other words **Barriers 7.1 (Problems concerning connection to existing electricity networks), 7.2 (Problems concerning connection to existing electricity networks) and 7.3 (Problems concerning development of a Trans-European Electricity Network)** do in fact exist and Portugal, but measures are being taken to address them.

9.1.2 Best Practice Elements and Indicators

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

10 Issue 8 Power Grid Issues

10.1 Description of the barrier

10.1.1 Detailed description of the Barriers and solutions

Apart from what was mentioned above concerning the infrastructure development, another difficulty has to do with the requirement for right-of-way of the transmission lines connecting the projects with the grid (being that the entities that manage the grid have access to different procedures that make this more easy). The question is then of the RES projects having the same status of the grid infrastructures for purposes of right-of-way concerning the accesses to the facilities and for the transmission lines connecting to the grid.

APREN considers that the current rules for the allocation of new connections to the grid is a barrier, in the sense that there are too many requests (many of which are of speculative nature) submitted to the permitting entity, which has then difficulties in evaluating those requests in a reasonable time. Some improvements are also noted as needed, aimed at a more equal and transparent treatment of all RES promoters.

Specifically:

Barrier 8.1 - Problems concerning grid connection

About this barrier, the following problems are identified:

- Long average lead time for getting approval of grid connection;
- Long average lead time for grid connection (different phases of the procedure from request of connection to activation of connection);
- Lack of simplified procedures of grid connection for small plants.

Barrier 8.2 - Problems concerning grid access

Currently this is not regarded as a problem, but the situation may change when the RES (namely wind) start competing with thermal and large hydro in a liberalized market.

Barrier 8.3 - Problems concerning TSOs and DSOs

As mentioned above, the stakeholders (through APREN) indicate that some improvements are needed, aimed at a more equal and transparent treatment of all RES projects.

10.1.2 Best Practice Elements and Indicators

No.	Technology	Benchmark	Result
8.1	All	Are the rules on cost sharing and bearing of grid connection objective, transparent and non-discriminatory ?	No
8.2	All	Is the denial of grid connection by TSOs and DSOs a common problem, constituting an important barrier for RES development?	Yes
8.3	All	Number of months for getting grid connection (considering also approval of grid connection)	> 24 > 12 for microgeneration
8.4	All	Estimated connection costs in Euros (in case producer pays)	n.d. (very variable)

11 Issue 9 Gas Network Issues

11.1 Description of barriers & solutions

11.1.1 Detailed description of the Barriers and solutions

This type of RES has a marginal importance in Portugal at the moment. The existing examples are mostly related with the use of biogas from landfills and from the digestion of sludge from wastewater treatment plants. In most cases the energy from the biogas is used in the facilities directly: when that does not happen, electricity is injected in the grid instead. There are no projects in which biogas is injected into the network and no prospects for that are known.

In general terms, this may have to do with the fact that in Portugal the grid is mostly concentrated along the coast, while many of the potentially interesting biogas producers are located more to the interior, therefore making the delivery to the grid more difficult.

For this reason, the production of electricity from biogas tends to be more easily implementable.

11.1.2 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?	n.a
9.2	Are the costs of grid connection for producers of gas from renewable energy sources objective, transparent and non-discriminatory?	n.a.
9.3	Do transmission and distribution tariffs discriminate against gas from renewable energy sources?	No
9.4	Average time needed for grid connection approval (from application for grid connection to formal approval) in months (#).	n.a.

Note: green gas is upgraded biogas to natural gas quality for grid injection.

12 Issue 10 District Heating

12.1 Description of barriers & solutions

12.1.1 Detailed description of the Barriers and solutions

It is considered that the heating and cooling sector has been quite neglected in what concerns the promotion of the incorporation of RES. Given the mild climate of Portugal and despite the abundance of resources, Portugal has been paying little attention to this sector, and the situation is quite different from what happens specially in Northern Europe.

Further, the use of RES technologies (namely solar) for water heating is starting to increase but it is considered that measures to promote the use of RES for acclimatisation inside the buildings are needed to have carbon neutral buildings. This is true for new buildings but even more so for existing constructions.

The main barrier for the use of RES in heating and cooling is the absence of heating and cooling infrastructures additional to the natural gas and electricity networks. This lack limits any generalized use of RES for heating and cooling. All over Portugal, there are only 2 examples of district heating and neither of these use RES.

As in the electricity sector, also here there is a lot of dispersed legislation, which complicates all the procedures and the interpretation of the requirements, executing small projects and a global vision of the sector.

In general, the following barriers are identified as required:

- There is a general lack of information and formal training (and certification, except for solar thermal) about the use of RES for heating and cooling;
- The national effort in terms of R&D can also be regarded as a barrier;
- There is no legal requirement for the new buildings or new urban development to have an infrastructure for water heated by a combination of RES;
- As mentioned before, the legal requirements are dispersed and in most cases the technical issues are mixed with higher-level matters, making all the interpretation and implementation more difficult and time-consuming;
- There is no obligation for large buildings to be acclimatised with a certain percentage of energy from RES; such an obligation would have a very relevant effect.

Specifically for **solar** energy:

- The solar energy is the one that has been more promoted for use in heating and cooling. The challenge may be in using solar energy for other uses than just heating sanitary waters, in particular acclimatisation and industrial processes;
- One current barrier is that the existing requirements for new buildings is to have 1 m² of solar collector per person but does not specify a requirement for the energy effectively delivered; being so, the efficiency and quality of the installed systems is not promoted.

Specifically for **biomass**:

- Biomass was once the only resource for heating. With electrification and domestic use of gas, these sources became predominant. There are tax issues (relating to VAT) that do not encourage the use of biomass;
- As mentioned before about the use of biomass for electricity production, the availability of the resource is a strong barrier;
- Currently the domestic market for biomass (for instance of pellets; note that about 90% of the pellets produced in Portugal are exported) has a small dimension and there are not much incentives to make it grow;
- In this current situation, the dimension of the market is itself a barrier.

Specifically for **geothermal**:

- Portugal has good conditions for the use of low-enthalpy geothermal systems but the effective potential and the types of heat-pumps better suited for each situation still require a better investigation;
- The need for regulations that simplify the permitting procedures of geothermal heat pumps has been identified.

However and as mentioned before, in Portugal DHC have a minimal expression and, ultimately the question here is whether DHC there are conditions for DHC systems being implemented, either in new developments or in the refurbishment of existing urban or commercial / industrial developments.

Being so, and considering that there are only 2 DCH systems are known in Portugal (neither of which use RES), **Barrier 10.1 (Lack of positive conditions for the increase of the share of renewables in existing DHC systems)**, may be considered as not relevant. However, even considering only those two systems, it must be noted that there are no specific policies or incentives aimed at increasing the share of RES.

The most important barrier is then **Barrier 10.2 (Lack of positive conditions for the initiation and expansion of DH systems largely based on renewable)**, as, in fact, there is no tradition whatsoever with DH / DHC of systems and this systems are not foreseen when planning new residential / industrial areas.

In Portugal, there may be a potential for increased importance of DHC not only in new developments but also in the scope of urban regeneration projects. However, specific policies or incentives will be required to change the status.

12.1.2 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%

Note: currently only 2 DH projects exist in Portugal.