

Portuguese Renewable Energy Sources: Overview



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1. Introduction

Renewable energy sources ("RES") play an important role in the energy mix of the future. The requirements set for climate preservation, the increase in energy consumption and the limited life of fossil fuels have been taken into account by European Institutions and countries in order to stop the vicious circle of energy consumption and climate changes.

The alternative is renewable energy. There are several clean and environment-friendly energy sources that do not have negative effects over the climate such as the sun, the wind, biomass or ocean waves.

Portugal has been one of the most enthusiastic countries as regards renewable energies. Portugal has achieved its commitments under the Kyoto Protocol and was allowed to increase 27% of the emission of greenhouse gases, however they had increased only by 19% until 2012. Decree-Law 141/2010, of 31 December 2010 established as a binding target that, by 2020, at least 31 % of Portugal's primary energy consumption should come from renewable sources (higher than the 20% set by the European Union). By 2020, the use of energy from renewable sources in energy consumption in all modes of transport is set at 10% of the total energy consumption. In 2012 61% of our electricity was already coming from renewable sources. Portugal reduced its foreign energy dependency from 89%, in 2005, to 71% in 2014. Between 2011 and 2014, a total 2.757 MW from renewable sources were licensed, achieving 11.6 GW of installed capacity.

2. Renewable energy sources

In 2014, renewable sources represented 32.5% of the electricity generated in Portugal. Still, more than 22.4% of the renewable quota was achieved by the electricity generated by large-scale hydro power plants (with more than 10 MW of capacity), which in the market are not considered as being part of the renewables sector.

2.1. Wind

Wind energy takes the leading role in renewable energy sources. As of December 2013 there were approximately 224 wind farms and 2,540 wind turbine generators ("WTG") installed in Portugal, a 42% increase from the 192 wind farms installed in 2008. As of March 2015 the number of wind farms is at 245 and the number of WTG almost reached the 2.500 mark (at 2.496).

In Portugal, the most attractive values of wind speed and regularity have been registered at the top of the mountains situated on the north bank of river Tagus. However, there are also some other interesting locations along the Costa Vicentina and Ponta de Sagres.

The regions where most power has been licensed are the districts of Viseu, Coimbra, Vila Real, Castelo Branco, Lisboa and Viana do Castelo. Bragança, Guarda, Lisboa, Vila Real, Santarém, Porto, Viana do Castelo and Aveiro have superior registries of hours of wind per year, with values between 2,019 and 2,633 hours.

2.2. Water

Water may be used to produce energy through several procedures. Generating power by converting the energy of running water into electricity (hydroelectric) is the most common technique. However, technological progress has revealed other energy producing procedures, such as tidal power (using turbines to produce electricity taking advantage of tide flows) or wave power (capturing the energy generated by ocean surface waves).

More than 70 hydroelectric plants with approximately 7,370 MW of total installed power are operated by EDP – Energias de Portugal.

Taking into account the dimension and characteristics of the Portuguese coast, the government has approved a pilot project for wave power in a testing zone created in Peniche that shall allow its exploration by 2016.

Recent studies have rated wave energy in Portugal as an energy resource with a medium-high potential. With an average annual flow of 30 MW per kilometre of water front with a depth of 50 meters, the Portuguese coast has the potential to generate approximately 10 TWh/year of electricity (about 20% of Portuguese consumption).

2.3. Biomass

Biomass refers to biological materials that can be used for industrial production or as fuel (biofuel). Biomass can also be used to generate electricity or heat. This diversity of uses has caused the production of biomass to become a growing industry.

To encourage the construction and operation of forest biomass power plants Decree-Law 5/2011, of 10 January 2011, provided a beneficial feed-in tariff calculus for power plants that start operating until 31 December 2016.

In 2013, biomass with combined heat and power (CHP) represented 367 MW of the installed power, while biomass without CHP represented 105 MW. As regards Municipal solid waste, it generates about 88 MW of power.

Portugal has had occasional incentives to renewable energy production: In February 2006, the Directorate-General for Energy and Geology (*Direcção-Geral de Geologia e Energia*) ("DGEG") presented 15 public offer for tenders with the purpose of delivering 100 megawatts of power. This initiative, however, was not a success. The main players of this market still feel that Portugal cannot produce enough biomass to cover all the basic needs, from fuel production to energy production.

Between 2007 and 2009 five thermoelectric plants were installed with a total installed power of 78 MW that use biomass as main fuel.

Today, biomass is a major export in Portugal: in 2013 the country had exported 824,000 tons of biomass worth € 111,000,000.00. Italy, United Kingdom and Belgium are the main importers.

2.4. Solar

Photovoltaic systems are used in a wide range of functions. Medium power applications are used for rural electrification, for the supply of domestic cargo in remote locations, for water pumping and irrigation and for supplementary supply to remote locations with or without network connection. Applications of small power are used for watches, calculators or other small accessories.

Boosting an annual average of 2,200 to 3,000 hours of sun in the mainland, and between 1,700 and 2,200, respectively, in the Azores and Madeira islands, Portugal has a strong potential for solar energy.

In 2013, the installed power in Portugal was of 226.6MW. This represented a 287.3% increase considering the mere 58.5 MW installed in 2008.

The Spanish company Acciona invested an estimated 200 million euros in one of the largest solar parks of the world, located in Moura, in the south of mainland of Portugal. This solar park has 46MW of solar power installed and an annual production of 93 GWH.

Decree-Law 118/2013, of 20 August 2013, establishes that the installation of solar thermal systems for heating domestic hot water in new buildings is required when there is proper sun exposure.

2.5. Micro Production

Decree-Law 153/2014, of 20 October 2014, in force since January 2015, waives licensing for the activity of electricity production when its goal is self-consumption or when production is carried out by small plants.

Micro production rules are meant to encourage domestic production for in-house consumption but the exceeding power may be fed in to the Public Service Electricity Network (*Rede Eléctrica de Serviço Público* – “RESP”). It is also possible to sell all the production to the RESP through a bidding system. In these cases, micro producers will take advantage of a specific tariff, that varies depending on the type of energy source and the amount of power already fed in by micro producers.

3. Legal Framework

3.1. Overview

Over time, the following main regulations have set out the legal framework for the licensing, generation and distribution of renewable energy:

- Decree-Law 189/88, of 27 May 1988, as amended by Decree-Law 313/95, of 24 November 1995, Decree-Law 168/99 of 18 May 1999, Decree-Law 339-C/2001, of 29 December 2001, Decree-Law 33-A/2005, of 16 February 2005, Decree-Law 225/2007, of 31 May 2007 (the “Old Renewables Law”);
- Decree-Law 312/2001, of 10 September 2001, as amended by Decree-Law 33-A/2005, of 16 February and Decree-Law 118-A/2010, of 25 October 2010 which governs the access to the transmission and distribution grids (“Old Renewables Access Law”);
- Decree-Law 29/2006, of 15 February 2006, as amended by Decree-Law 104/2010, of 29 September 2010, Decree-Law 78/2011, of 20 June 2011, Decree-Law 75/2012, of 26 March 2012, Decree-Law 112/2012, of 23 May 2012 and Decree-Law 215-A/2012, of 8 October 2012, which approved the general rules applicable to the National Electric System (*Sistema Eléctrico Nacional* – “SEN”) and to the different activities relating to energy production;
- Decree-Law 172/2006, of 23 August 2006, (the “Renewables Law”) as amended by Decree-Law 237-B/2006, of 18 December 2006, Decree-Law 199/2007, of 18 May 2007, Decree-Law 264/2007, of 24 July 2007, Decree-Law 23/2009, of 20 January 2009, Decree-Law 104/2010, of 29 September 2010 and Decree-Law 215-B/2012, of 8 October 2012 (that revoked the Old Renewables Law and the Old Renewables Access Law); and
- Decree (*Portaria*) 243/2013 (the “Renewables Access Regulation”).

3.2. Licensing procedure

From 1988 to 2006 the licensing procedures for renewable energy power generation were only dependent of the verification of technical requirements following the promoters’ request for a grid connection point in accordance with the Old Renewables Law and the Old Renewables Access Law that ruled the award of grid connection points.

The Renewables Law and Renewables Access Regulation both establish that the attribution of grid connection points must result of a public initiative, such as a public tender or similar procedure.

In fact, power generation based on RES is a strongly regulated activity. The Renewables Law and the Renewables Access Regulation set a licensing procedure for the installation and operation of

RES facilities, in three stages: (i) obtaining a point of reception of the energy in the RESP grid ("grid connection point"), (ii) obtaining an authorisation to install the facility and (iii) requesting a license to operate the facility.

The grid connection point is granted by DGEG subject to a favourable preliminary assessment in respect of the availability of capacity in the RESP, which is followed by an application for the awarding of the grid connection point. This grid connection point is subject to a power generation capacity cap.

The authorisation to install the facility is granted (i) by the Ministry of Economy, for facilities whose capacity exceeds 1 MW, or (ii) by the Director-General of DGEG, for facilities with capacity up to 1 MW.

Last, the license to operate the unit is granted after a final inspection conducted by (i) the competent Regional Directorate of the Ministry of Economy (*Direcção Regional do Ministério da Economia*), if the capacity is up to 10 MW, or (ii) by DGEG, in the remaining cases.

The Renewables Law and the Renewables Access Regulation also set other conditions applicable to the projects of power generation using RES, such as:

- A 24 months deadline, starting from the date the authorisation is granted, for the installation of the facility; and
- The connection to the RESP must be supported by the promoter.

The promoters of renewable energies facilities benefit of some special powers in order to ensure their project's deployment, such as:

- The power to use the State and the Municipal public and private domain;
- The right to expropriate real estate (once expropriated, the properties become property of the State or of the Municipality and will remain allocated to the project for a period of 35 years in exchange of the payment of a periodical fee); and
- The right to establish rights of way necessary to the project under the same terms applicable to expropriation procedures.

3.3. Feed-in tariff

The Old Renewables Law first established in 1988 the feed-in tariff ("FiT") mechanism with prices of €40-50/MWh. The framework was modernised in 1999 with a feed-in tariff increase, which was further increased to an average €80/MWh in 2001. From 2005 onwards feed-in tariffs for new facilities were reduced, but earlier facilities under operation were not affected by such reduction.

The FiT is thus a guaranteed price for sale to the RESP of energy generated from RES. The applicable tariffs are determined by adding up three components:

- Avoided investment costs on new power plants;
- Avoided costs on transmission, operation and maintenance, including fuel costs; and
- Environmental benefits arising from the use of renewable sources.

The tariffs are paid to the operators upon purchase of their production. These costs are not borne by the Government – instead, they are included in the electricity invoice paid by all end-users. This cost transfer system is considered acceptable as long as there are no substantial discrepancies between the consumer market and business market.

Operators were granted a 15-year feed-in tariff. An extended tariff period of 5 to 7 years has been negotiated in 2012 by the Portuguese Government and the wind farm producers (as explained in section 4.4 below).

Along with the FiT, energy generated at renewable energy facilities benefits from a 100% offtake obligation of EDP - Serviço Universal S.A. and several other local companies that are operators of last resort (*comercializador de último recurso / comercializador regulado*). This offtake obligation continues after the feed-in tariff period comes to an end, with a “market facilitator” taking the place of the operator of last resort.

3.4. Other support measures

The Government has undertaken a “Commitment to Green Growth” granting access to an € 1.000.000.000 fund in connection for energy efficiency and the efficient management of water and waste projects. Municipalities, by resolution of the municipal council, may set a reduction up to 15% of the property tax (*IMI*) applied to buildings with high energy efficiency:

- Buildings with energy class equal or higher than A, in accordance with Decree-Law 118/2013, of 20 August 2013;
- Building where the execution of construction works, reconstruction, modification, extension and maintenance, improve their energy class in at least two classes;
- A reduction of up to 50% of IMI may be applied to properties that are solely affected to the production of energy from renewable sources.

4. In-depth: Wind power

4.1. Background

Historically, there have been no retroactive changes to legislation affecting renewable energy production, so investments in existing wind farms are not likely to be affected by any future regulatory changes.

Relationships with commercial partners in transmission of energy and distribution of energy are stable as they were awarded the concession of the management and the utilization of the Portuguese power grid for several years.

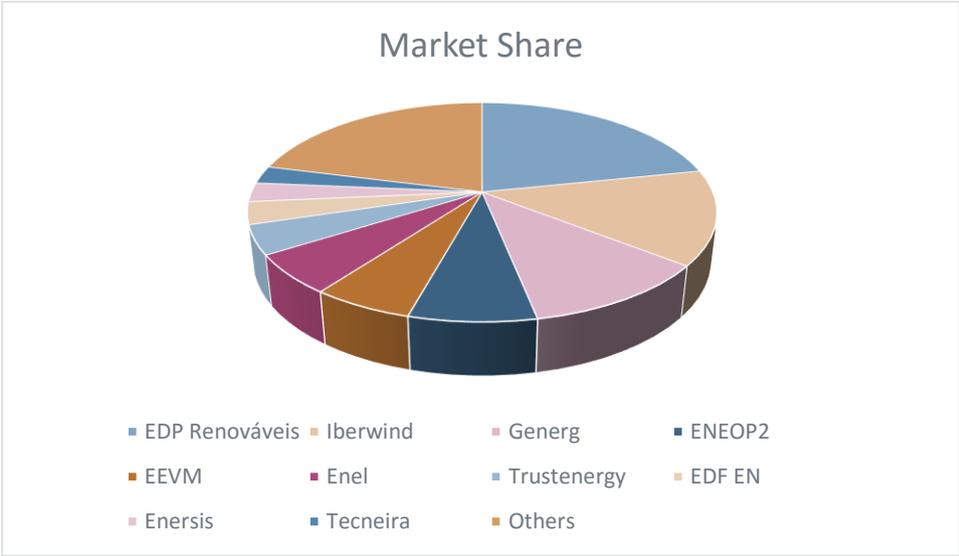
The existence of feed-in tariffs and the last resort operator offtake obligation until 2020 provide for low-risk investments – revenue directly increases according to the energy produced at every wind farm. Extended regulated tariffs after 2020 and the market facilitator offtake obligation extend those favorable conditions.

4.2. Statistics

According to DGEG's Renewables Report of March 2015, the annual wind power production between April 2014 and March 2015 was of 11,558 GWh, or 11,861 GWh normalized in accordance with Directive 2009/28/EC. Further statistics can be found in the table below.

As of March 2015	
Production (GWh)	11,558
Installed capacity (MW)	4,953
Hours of equivalent production	2,333
Total wind farms	245
Total WTG	2,496

Portuguese wind power market has three players controlling roughly 47% of the market (EDP Renováveis, Iberwind and Generg), seven companies comprising another 32% of the market (having individual market shares ranging from 3% to 7%) and the remaining 21% being distributed between players having market shares below 2.5% each. This is illustrated in the chart below.



4.3. Extended regulated tariffs

As referred above, wind power facilities benefit from a 15-year FiT. After the guaranteed FiT period expires, and as alternative to free market pricing, Decree-Law 35/2013 allowed for an extension of regulated tariffs for wind power plants, through agreements between the Government and individual producers. The following options exist:

Option	Tariff	Duration of regulated tariff	Monthly consideration 2013/2020
1	Floor: €74/MWh Cap: €98/MWh	5 years	€5,000/MW
2	Floor: €60/MWh	5 years	€5,000/MW
3	Floor: €74/MWh Cap: €98/MWh	7 years	€5,800/MW
4	Floor: €60/MWh	7 years	€5,800/MW

4.4. Overpowering and additional energy

Along with repowering, overpowering has been regulated since 2007 by Decree-Law 225/2007 and subsequently by Decree-Law 51/2010 “Old Overpowering Regulations”. The installation of new wind turbines is allowed in order to attain an increase in installed capacity, limited to 20% of the grid connection capacity, subject to authorisation from DGEG.

Under the Old Overpowering Regulations and in those cases where guaranteed FiT tariffs apply, overpowering implied a reduction to the FiT, applicable to the total wind farm energy output, of (initially of 0.3% to 0.4%) 0.12% per each new 1% of increased power.

The Old Overpowering Regulations have been replaced by Decree-Law 94/2014 that has set a new tariff of €60 per MWh applicable to overpowering output only (and additional energy¹); allowing promoters with overpowering authorisations obtained prior to 25 June 2014 the option to request the application of this new regime or remain attached to the discounted tariff.

¹ Active energy resulting from usage of additional capacity. The maximum amount of additional energy is reached by subtracting the connection capacity from the installed capacity (excluding overpowering).

5. The future

5.1. National strategy

In 2013 the Portuguese Government established a National Action Plan for Renewable Energies (*Plano Nacional de Ação para as Energias Renováveis - PNAER 2020*) through Council of Ministers Resolution 20/2013, of 10 April 2013. Some of the policy incentives to renewable energy investment until 2020 are as follows:

- Promoting the installation of solar thermal systems in the residential sector, in swimming pools and sports facilities, as well as the renovation of dated solar thermal systems;
- Promoting the installation in buildings of more efficient energy systems and improve environmental performance fed by biomass for conditioning purposes;
- Streamlining the licensing procedures of renewable electricity plants;
- Granting of incentives to be applied to power plants dedicated to forest biomass within a certain framework, through agreements with the promoters of the plant; and
- Promoting the use of endogenous resources and waste for the production of biofuels.

In 2015 the energy sector objectives are laid down in the broader “Commitment to Green Growth”. This Commitment sets out ambitious goals, such as:

- Reaching 31% renewable energy in gross end-consumer power consumption by 2020 and 40% in 2030 (from a figure of 25.7% in 2013, accounting to 57.4% of the renewable electricity production);
- Reducing the renewable energy price by 30-40%;
- Increasing self-consumption to 300MW by 2020, lowering prices and allowing for the sale of excess production to the national grid;
- Reducing the Public Administration’s energy consumption by 30% in 2020 and 35% in 2030;
- Reducing the energy consumption of building by 25% in 2020 and 30% in 2030;
- Establishing energy interconnection, with the goals of 12% by 2020 and 25% by 2030;
- Promoting export of renewable energy to other EU countries; and

- Establishing, within the EU, natural gas interconnections with Portugal as entryway of LNG to Europe, comprising a third interconnection between Portugal and Spain upon confirmation of the entry into operation of the Pyrenees interconnection and upon award of EU funds; 25% of interconnections by 2030 with 50bcm of NG imports from Europe originating in the Iberian Peninsula instead of in Russia.

The Portuguese Government is also committed to improving electric mobility, by expanding the national public grid of charging stations and privileging installation of charging infrastructures at home and in the workplace, to reducing the price difference of electric vehicles and plug-in hybrids vis-à-vis conventional vehicles, through the green taxation reform, as well as to sponsoring the acquisition of electric vehicles in the public administration.

The Iberian Market of Electric Energy – MIBEL results from a process of cooperation developed by Portugal and Spain in order to promote integration of the electricity systems of both countries.

As far as MIBEL is concerned, both Portuguese (*Entidade Reguladora dos Serviços Energéticos - ERSE*) and Spanish (*Comisión Nacional de Energía – CNE*) sector regulators have been working on the legal and regulatory framework of MIBEL.

According to the monthly report of 15 March 2015, 18.008 GWh of energy were negotiated on the daily market (13.743 GWh of energy acquired in Spain and 4.265 GWh of energy acquired in Portugal). 62% of the energy placed on the daily market came from renewable energies.

This report also stated that the arithmetic average price during the month was €43.13/MWh in the Spanish area while in the Portuguese area was €43.22/MWh.

5.2. Outlook

The recent developments in the energy-generation technologies have devised cleaner, more efficient and environment-friendly procedures, of particular importance in the present-day political and energetic context, following the Kyoto Protocol and the Bali Conference.

Furthermore, the present-day efficiency levels of most renewable energy sources make them a significant competitor to fossil fuels. The recurring price increase of oil and other raw materials are an additional incentive for the search for alternative energy sources.

In Portugal, the Government strategy is based in using renewable energy sources, namely wind power, wave power and hydroelectric. Its goals are quite ambitious and it relies on private sector investment partners to achieve it.

The renewable energy markets will, therefore, be a striving force in the upcoming years and it is most sure that new business opportunities will arise.

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