

# PORTUGAL

## MARKET OVERVIEW

Portugal is one of the leading countries in Europe in terms of wind power penetration, with 17.6% of its electricity demand met by over 4 GW of wind power capacity in 2011. Wind energy is the second most developed renewable source, after hydropower. The country adopted a target of achieving 20% of its energy consumption from renewables by 2020 under its National Renewable Energy Action Plan. Existing and planned wind farms are mainly concentrated in the northern part of the country<sup>150</sup>.

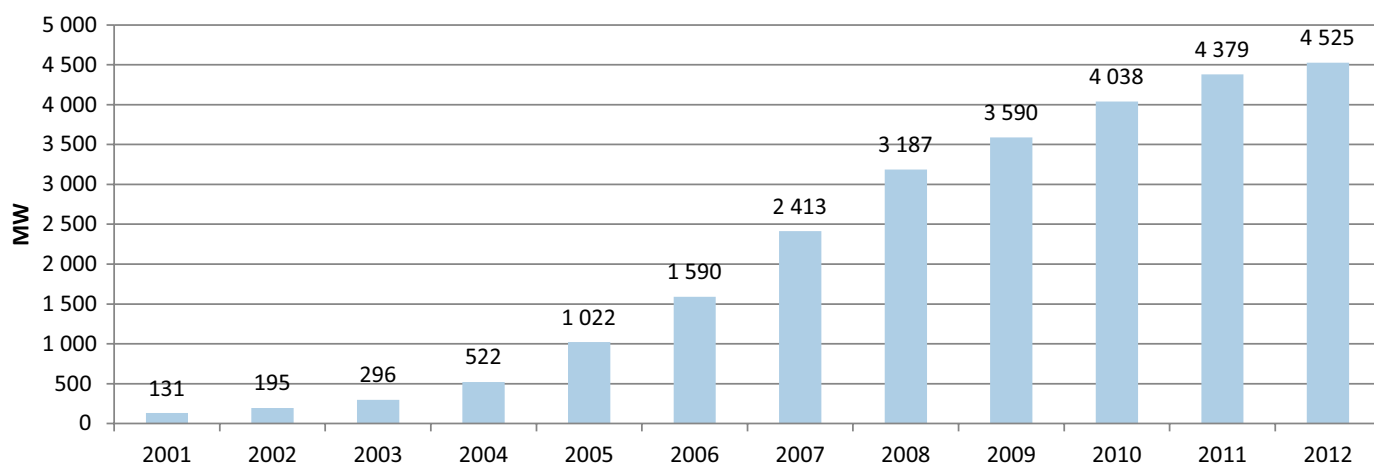


Figure 14: Cumulative Wind Installation (MW) of Portugal (GWEC, 2011)

## HISTORY AND EVOLUTION OF POLICY AND REGULATORY FRAMEWORK FOR WIND ENERGY

Portugal has no proven oil or natural gas resources of any significance, although historically its energy supply relied largely on those fuels. The country's electricity consumption increased significantly from 23.5 TWh to 46.5 TWh during the period from 1990 to 2003.

Energy independence and the use of indigenous renewable energy resources have become an important part of the country's energy strategy. According to the Portuguese Renewable Energy Association (APREN) electricity generation from renewable energy sources

accounted for 46.8% of mainland Portugal's total consumption in 2011 (Ascenso, n.d.).

### Phase 1:

#### Early regulatory and tariff support for renewables (1988-2001)

The first law guaranteeing grid access for Independent Power Producers (IPPs) using renewable energy sources came into force in 1988<sup>151</sup>. At that time the legislative framework was only applicable to small hydropower (below 10 MW), but an amendment in 1995<sup>152</sup> extended it to other renewable energy sources, such as wind power.

<sup>150</sup> Most wind farms located in Portugal are in the northern half of the country. The windier locations in Portugal are usually in coastal regions and on mountaintops. However, as the Portuguese coast is densely populated, wind farms in Portugal have mostly been built inland, on mountains, to make the most of the country's wind resource (Eolicas de Portugal (ENEOP), n.d.).

<sup>151</sup> Decree-Law no. 189/88 passed on 27 May, 1988. With Decree 189/88, Portugal introduced a legislative framework to regulate the production of renewable electricity.

<sup>152</sup> Decree-Law no. 313/95 passed on 24 December, 1995.

The scheme has been reviewed several times since then, following the evolution of the electricity market and its liberalisation. The production of electricity from renewable energy sources was included in the PRE regulation (Produção em Regime Especial or Special Regime).

This legislation also set a feed-in tariff scheme for the first time. The scheme was revised in 1999<sup>153</sup>, and a more complex formula was introduced. The new feed-in tariff formula took into account the avoided costs of investing in conventional power plants; the avoided costs of operating and maintaining a conventional power plant; avoided environmental costs in terms of CO<sub>2</sub> emissions; and the inflation rate (GWEC, 2010). The feed-in tariff has been revised several times, but the concept of compensating for avoided costs is still in use.

Portugal started promoting research and development (R&D) on renewable energy technologies in the early 1990s, through the institute for Industrial Engineering and Technology (INETI). Several new companies were created at this time to explore the country's wind energy potential and develop wind energy technology. For example, the wind energy development company Erenova was created as a subsidiary of the public utility Electricidade de Portugal (EDP). These companies, along with the National Renewable Energy Association (APREN), created in 1988, were key drivers for the implementation of wind energy schemes<sup>154</sup> during the 1990s.

INETI has undertaken a detailed evaluation of Portugal's wind resources, and published a wind atlas for the country. Financing became increasingly available for wind projects, leading to a surge in new projects from 2000 onwards. However, one of the limitations for wind energy in Portugal was the quality of the grid infrastructure, which increased the connection costs and delays.

## Phase 2:

### Incentives to stimulate renewable electricity production (2001-2012)

Consistent with the European Directive on renewable electricity (2001/77/CE), Portugal launched the E4 Programme (Energy Efficiency and Endogenous Energies) in 2001. The E4 set an objective of 39% (later increased to 45%) of the country's gross electricity consumption to be supplied from renewable energy sources (including large hydropower) by 2010.

A series of initiatives were launched between 2001 and 2003 to stimulate the electricity market, including:

- » A Decree-Law establishing a range of favourable feed-in tariffs for electricity produced from renewable energy sources<sup>155</sup>.
- » A Decree-Law regulating the delivery of electrical energy into the low-voltage grid (micro-generators, including PV)<sup>156</sup>.
- » A broadened scope for financial incentives for energy efficiency and use of indigenous energy sources in the framework of the POE/PRIME Programme<sup>157</sup> (the Operational Programme for Economic Development<sup>158</sup>).

In 2001, the new legislation supported the wind energy sector by clarifying the licence-granting process for grid access and simplifying the administrative procedures.

Along with these measures, in the same year, the feed-in tariff formula was also updated, with the introduction of a new factor, to differentiate between technologies. Under the new legislation, EUR 0.082/kWh (USD 0.144/kWh) would be paid for the first 2 000 hours of wind

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<sup>153</sup> Decree-Law no. 168/99 passed on 18 May, 1999.

<sup>154</sup> A number of wind projects were established on Portuguese islands in the late 1980s and early 1990s, but the first mainland wind scheme was built in 1992. This consisted of twelve 150 kW machines, totalling 1.8 MW.

<sup>155</sup> Decree-Law no. 339-C/2001 passed on 29 December 2001 with following amendments.

<sup>156</sup> Decree-Law no. 68/2002 passed on 25 March, and amended in 2007. The share of wind power in micro-generation continues to be negligible.

<sup>157</sup> Provided direct subsidy payments, though it did not have a significant impact on the growth of wind energy.

<sup>158</sup> The Ministry of Economy, through the Secretary of State for Economy, was the public authority that oversaw the energy sector. The General-Directorate for Energy (DGE) is the entity responsible for the development, execution and evaluation of the energy policy.

<sup>159</sup> There numbers are based on 2002 values.

<sup>160</sup> Decree-Law no. 33-A/2005 passed on 16 February, 2005.

energy production each year<sup>159</sup>. The tariff was reduced by blocks of 200 hours, reaching a minimum of EUR 0.04/kWh (USD 0.07/kWh) after 2 600 hours.

A special tax, payable to the local municipality, of 2.5% of the total revenue from wind projects was also introduced (GWEC, 2010). This provision was introduced to ensure benefits to local communities (European Renewable Energy Council (EREC), 2009).

Between 2001 and 2005, a major source of investment support was the “Incentive Scheme for Rational Use of Energy’ (SIURE)” which provided capital grants for different types of renewable installations. The scheme was run by the Ministry for Industry and Energy and supported by the European Union.

The most significant increase of wind power capacity in Portugal took place between 2004 and 2009. During this time more than 500 MW was installed annually.

In 2005, revisions to the previous feed-in tariff legislation<sup>160</sup> limited the power purchase agreements to the first 33 GWh produced per MW installed, or 15 years, and decreased the tariff to EUR 73/MWh (USD 114.83/MWh). Once this threshold had been reached, the operators would receive the market price plus the prevailing market value of green certificates at that time.

In 2005, a tender for 1 800 MW of wind power was released in three phases: phase A – 1 200 MW won by the ENEOP consortium; phase B – 400 MW won by the Ventinveste consortium; phase C – 200 MW distributed between several small projects<sup>161</sup>.

Following completion of the tendering process, an industrial cluster for wind energy was developed, representing an investment of approximately EUR

290 million (USD 456.16 million). The industrial cluster was an outcome of the tendering conditions, since a condition of bidding involved working with local manufacturing companies to establish clusters of industries. The initiative aimed to create jobs and local economic development, while reducing the installation costs for new wind generators.

The Portuguese company Redes Energeticas Nacionais S.A. (REN) carries out the development of the transmission grid. There is a single operator for the national grid<sup>162</sup>, EDP Distribuicao (EDPD<sup>163</sup>). Grid connection procedures are normally completed in a timely manner<sup>164</sup>. The National Transmission Grid Development and Investment Plan for the period 2012-2017 (P-DIRT) includes gradual and phased expansion of the electricity network.

No new wind power capacity was granted between 2005 and 2012. The National Renewable Energy Action Plan (NREAP) was presented to the European Commission in August 2010. The Plan included 6 875 MW for wind power of which 75 MW was for offshore wind. In order to reach this objective, approximately 1 000 MW of new wind projects are required, which will need to be contracted by future tenders.

## Impacts of the economic crisis and reduction in renewable energy support

By middle of 2011, the Portuguese economy was under scrutiny by the International Monetary Fund, the Central European Bank, and the European Commission<sup>165</sup>. The Memorandum of Understanding (MoU) that rules the conditions for the financial assistance to Portugal defined measures to be taken on the energy sector. The provisions relevant for renewable electricity production under the Special Regime are as follows:

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<sup>161</sup> The reference tariff offered was determined under Decree-Law no. 33-A/2005, but each of the bid winners gave discounts, which ranged between 5% for phases A and B, to a maximum of 23% for one of the projects in phase C (meaning a bid of only EUR 57/MWh (~ USD 89.66/MWh)).

<sup>162</sup> To meet the terms of its bailout agreement the Portuguese government sold a 40% stake in REN for EUR 592 million (USD 800.06 million) to State Grid International of China and to the Oman Oil Company in early 2012.

<sup>163</sup> As part of Portugal’s bailout plans the China Three Gorges Corporation agreed to pay EUR 2.69 billion (USD 3.74 billion) for 21% of EDP in December 2011 (Almeida and Reis, 2012).

<sup>164</sup> In Portugal electricity generation is allocated between: (a) PRO or Ordinary Regime Production, which makes offers on the market, includes plants such as oil/coal-fired conventional thermal, combined cycle gas turbines and large hydro, and (b) PRE or Special Regime Production, with feed-in tariffs. The PRE group includes all the renewable technologies generating electricity plus some non-renewable fuel-fired cogeneration plants. PRE gets priority in case of grid congestions. PRE production can only be restricted when a very specific production source can solve the grid congestion. Currently, the owner of a project in Portugal has no obligation or responsibility to forecast its production.

<sup>165</sup> Statement by the EC, ECB, and IMF on the First Review Mission to Portugal, Press Release No. 11/307 (August 12, 2011)

“5.8. Review in a report the efficiency of support schemes for renewables, covering their rationale, their levels, and other relevant design elements.

5.9. For existing contracts in renewables, assess in a report the possibility of agreeing a renegotiation of the contracts in view of a lower feed-in tariff.

5.10. For new contracts in renewables, revise downward the feed-in tariffs and ensure that the tariffs do not over-compensate producers for their costs and they continue to provide an incentive to reduce costs further, through digressive tariffs.

For more mature technologies develop alternative mechanisms (such as feed-in premiums). Reports on action taken will be provided annually in Q3-2011, Q3-2012 and Q3-2013.”

Following the bailout, national elections were organised, and the government changed. Since 2011, there has been significant regulatory instability in the Portuguese wind energy market. The existing support schemes (feed-in tariffs) have been under negotiation with the producers and there were several policy changes that triggered insecurity, including a new legislation in February 2012<sup>166</sup> which suspended all new power generation allocation procedures indefinitely (APREN, 2012).

In April 2012, a public consultation was started to review the National Renewable Energy Action Plan, decreasing scheduled capacity for all renewable energy technologies in 2020. The wind power capacity was lowered to 5 300 MW in 2020, which corresponds to the remaining capacity granted in the 2005 tender, and a few other equipment projects<sup>167</sup>.

As a consequence, no new wind power capacity would be allocated up until 2020, unless a review is conducted in 2014 as envisaged in the review document.

With Decree-Law 25/2012, the current negotiations and the new NREAP in place, the Portuguese renewable energy sector is waiting for the end of this period of instability, and for improved conditions after the 2014 review of the energy policy.

## Development of Iberian (Portuguese-Spanish) electricity market

In 1999, the Portuguese and Spanish governments signed a “Protocol for Cooperation between the Spanish and Portuguese governments for the creation of the Iberian Electricity Market”.

The Protocol was intended to guarantee Portuguese and Spanish consumers better access to domestic and foreign electricity networks. It gives Iberian electricity operators the possibility of contracting directly with the end consumers in a common Iberian electricity pool.

The Iberian Electricity Market or “Mercado Ibérico de Electricidade” (MIBEL) became operational in July 2007. The initiative triggered the establishment of an integrated regional electricity market. MIBEL has one common price for electricity for Spain and Portugal if there is sufficient interconnection capacity.

The MIBEL spot market is to be managed by the Spanish market operator (OMIE), and the derivatives market is to be managed by the Portuguese market operator (OMIP).

Following the 2006 Badajoz Summit and the signing of the regulatory compatibility agreement between Portugal and Spain in March 2007 under the MIBEL, the first virtual capacity auctions took place. In Spain, they were organised jointly by Endesa and Iberdrola, and in Portugal, by REN Trading.

By the end of 2009, the governments of Portugal and Spain had formally published the International Treaty signed in Braga (in 2008) to establish the Iberian Market Operator (OMI), thereby taking another important step towards bringing the regional market to full maturity.

The first meeting of the common Board of Directors of the companies managing MIBEL – i.e. OMIE (spot market) and OMIP (derivatives market) – was held in 2011. It represented an important step towards the implementation of the Iberian Power Market Operator (OMI) after 11 years of negotiations for the creation of a regional electricity market.

## CURRENT CHALLENGES

As part of Portugal's broader economic restructuring under its bailout obligations to the EU, the European Central Bank and the IMF, the country must privatise a significant portion of its energy sector, and transpose the European legislation for the liberalisation of the energy sector. The government is required to revise, reduce and revoke several of its incentive mechanisms for renewables in 2012-13. The credit crisis also impacted on project financing in 2011-12. Therefore, Portugal's planned 2014 review of its 2020 renewable energy targets will take place at a time of national economic restructuring and tight government budgets.

To increase the penetration of renewable energy in the energy mix, the country would need to increase its grid and storage capacities. The increase in storage capacity could be mostly achieved through an increase of the hydropower capacity. IPPs are facing severe difficulties in connecting to the grid, due to the low capacity of the system, and issues in accommodating all connection requests (Re-Shaping, n.d.).

## CONCLUSION

Portugal implemented a stable feed-in tariff for wind energy of EUR 74/MWh (USD 107.13/MWh). This tariff was valid for 15 years, and was adjusted for inflation. Taking into account the 2005 tenders, the country has one of the lowest feed-in tariffs in Europe. The use of a mixed tariff-based and tendering process has enabled the wind sector to benefit from a constant project pipeline. This system proved to be effective, and resulted in excellent growth, both in terms of installed capacity and electricity generation, between 2005 and 2010.

Strong government support over a long period of time, and a large and continuous pipeline of projects, provided long-term market viability to the industry. Local municipalities received a portion of the gross income generated by the wind projects, which increased public acceptance and facilitated a cooperative environment between the power producers and the municipalities.

From 1990 to 2010 electricity prices in Portugal decreased to below the European Union average, which confirms the positive effect of the domestic energy policy (APREN, 2011). However, consumers were not charged the full costs of electricity production, which led to a tariff deficit of over EUR 2 million (USD 2.9 million). This deficit was mistakenly attributed to the renewable energy sector. In addition, VAT has been increased from 6% to 23%. Electricity producers and the government therefore face challenges in justifying inevitable future electricity price increases.

By 2020, Portugal intends to be generating 60% of its electricity from renewable resources, in order to satisfy 31% of its final energy consumption. Grid integration will be a critical element for developing wind power. Interconnecting with the larger Spanish electricity market and the large hydropower system<sup>168</sup> enabled to integrate large amount of wind energy to the grid. However the interconnection capacity with Spain is already insufficient, since the wind regime is similar in both countries, and both countries have an overcapacity of gas and coal generation. Smart grids are now being promoted and deployed throughout Portugal as part of the National Energy Strategy. Their introduction is being combined with more efficient management of the existing networks.



Tetouan Wind Farm, Morocco©CDER

<sup>166</sup> Decree-Law no. 25/2012, passed on 6 February.

<sup>167</sup> Decree-Law no. 51/2012, passed on 20 May, allowed for the installation of 20% more power than the power stated in the grid connection allowance, in return for a discount on the feed-in tariff.

<sup>168</sup> The implementation of the Large Hydro National Plan is expected to increase Portugal's pump storage capacity from 1 100 MW in 2011 to 4 850 MW in 2020, and thus reduce the limitations of wind production during off-peak hours, ensuring the economic feasibility of the installation of the new capacity.

## ANALYSIS ON ENABLING CONDITIONS FOR WIND ENERGY

<p><b>Effective rule of law; and transparency in administrative and permitting processes</b></p>	<p>Historically the regulatory framework has been stable. However, since 2010, there has been limited clarity on the future of the tariff and support schemes for renewables, due to the need for structural adjustments in the Portuguese economy. The short-term actions now being deployed to meet budgetary obligations may affect long-term investment priorities. According to the European Wind Energy Association, the average lead-time for project developments could now reach 58 months, when the EU average was 24 months in 2010.</p>
<p><b>A clear and effective pricing structure</b></p>	<p>Feed-in tariffs were available for almost all renewable energy producers. The tariff system is combined with tendering schemes, and has proven to be effective. The tariff system has led to a very steep growth of both installed capacity and electricity production over the last five to six years. Both the scheme and the tariffs have been continuously monitored against the level of market prices.</p>
<p><b>Provisions for access to the grid (incentives and penalties for grid operators)</b></p>	<p>Renewable energy projects have priority on access to the grid, as stated in the National Energy Strategy Plan. Sites for new wind and forestry biomass power plants are tendered and located where the grid can be efficiently and consistently developed.</p>
<p><b>An industrial development strategy</b></p>	<p>The government supported the development of industrial clusters, thus creating a local supply chain. Long-term targets for wind energy and a large pipeline of projects provided the necessary long-term visibility on market conditions to allow a local supply chain to be built.</p>
<p><b>A functioning finance sector</b></p>	<p>The stability of the support scheme, and of other fiscal incentives through the last decade, allowed for predictable returns on investments. Project financing was easily available until the economic crisis.</p>
<p><b>Expression of political commitment from government (e.g., targets)</b></p>	<p>Portugal intends to supply 60% of its electricity from renewable resources by 2020, in order to satisfy 31% of its final energy consumption.</p>
<p><b>A government and/or industry-led strategy for public &amp; community buy-in</b></p>	<p>The 2.5% (of gross income from wind projects) tax-based contribution to municipalities helped to improve public acceptance and cooperation between project developers, power producers and the municipalities.</p>

## An employment development strategy

Small- and medium-size enterprises were supported to develop capacity and manpower for building and operating renewable energy projects and manufacturing equipment.

## NOTE

**Portugal has had one of the most stable policy and regulatory regimes for wind. However, the ongoing financial and economic crisis will greatly affect the future of the sector.**

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