# Entering Renewable Energy Sources in the Spanish Electricity Market: The Effects of Regulatory Reforms

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**European Legal Framework on Renewable Energy Sources**

The generation of electricity from renewable resources (RES) in a liberalized electricity market is an energy policy issue in debate. Liberalization of the electricity sector jointly with the reduction of the greenhouse gas emissions are two main targets of energy policy within the European Union (EU). Despite the first officially renewable energy policy programme started in 1974, the first steps to meet the targeted objectives for renewable energy in the EU were taken in 1994 at the Madrid Conference, where the RES-E White Paper *Energy for the future - renewable sources of energy* was formalised. According to the Kyoto Protocol and the agreements following it, the EU commited itself to reducing emissions of greenhouse gases by 8% during the period 2008-2012 in comparison with 1990 levels. Concerning the electricity sector, the RES-E White Paper states that electricity production from RES could grow from the present 14.3% to 23.5% by 2010.

Liberalization of the electricity sector is an ongoing progressive process in all EU member states since the Directive 96/92/EC on the common rules for the internal electricity market. With respect to renewable electricity, liberalization of the market implies both new opportunities and threats. First, in a competitive market, renewable electricity may be less competitive than conventional electricity due to the failure of prices to account for all the costs of the associated environmental impact. As a result, an inefficient use of resources may occur. Therefore, efficiency requires that environmental costs be reflected in energy pricing. Unfortunately, reaching this target is hindered by two serious difficulties: incomplete information on environmental costs, and limited experience in the application of internal regulation mechanisms. Second, liberalization brings the opportunity for new agents to enter the market as long as the system operator guarantees free and indiscriminate access to the grid to promote competition.

In Spain and other member states priority has been granted to pass electricity generated by RES through the grid, as it was specified in the European Directive 1996/92/EC. Later on, the Directive 2001/77/EC and its amendments encourage the promotion of electricity from within the internal electricity market. The Directive follows up the RES-E White Paper on renewable energy sources which set a target of 12% of gross energy consumption from renewables for the EU-15 by 2010, of which electricity would represent 22.1%. With the 2004 enlargement, the EU's overall objective became 21%. This Directive is also an essential part of the package to comply with the commitments made by the EU under the Kyoto Protocol on the reduction of green house emissions.[1] In addition, the member states must adopt and publish a report setting the indicated national targets for future RES-E consumption. The Directive also provides for a system concerning the guarantee of origin of RES-E in order to facilitate exchange and to increase transparency while facilitating consumer choice. The guarantees of origin indicate both the renewable energy source from which the electricity is produced and the date and place of production.

In what follows, we explore how the implementation of this EU regulatory regime has enhanced generation from RES within the ongoing liberalization process in the Spanish electricity sector.

**Policy Mechanisms to Promote Renewable Sources in the EU**

Regulation attempts to internalize environmental costs by means of indirect mechanisms aimed at mitigating market imperfections. Since under Directive 2001/77/EC each country is free to choose their preferred support mechanism, many ways to support renewable energy and a broad variety of methods have been implemented in the different member states.

The major categories of relevant policy mechanisms are financial instruments and fiscal incentives. Financial instruments are economic incentives that encourage technological transformation favouring activities with a smaller environmental impact. The most prominent ones are the schemes based on direct price support, investment aid or tax exemptions or reductions. Under direct price support schemes, generators from renewable energy sources receive financial support per kWh supplied. There are essentially two categories of direct price support mechanisms within the EU; quota-based systems, and fixed-price systems. Under quota-based system, producers are obliged by the government to produce a fixed share of renew-

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See footnotes at end of text.

able energy, determined through a competition mechanism. Two different mechanisms operate at present: green certificates and tendering schemes. Fixed-price systems imply that no quota or maximum limit is set for renewable energy. Such a limit or quota is, however, created indirectly by the level at which the renewable energy price is set.

Fiscal incentives include a given level of subsidy or tax deduction to promote the technological development of some expensive technologies. Granting some form of investment subsidy is a simple way of promoting the technological development of expensive, renewable energy techniques. Some member states also support renewable electricity, directly or indirectly, through tax incentives.

**RES Regulatory Policy in the Spanish Electricity Market**

The Special regime establishes the framework to promote electricity generation from RES. It has been regulated in Spain since 1980 when Law 80/1980 on Energy Conservation came into force. It established energy efficiency improvement objectives for the industry and reductions in external dependence. As a result self-generation of electricity and hydroelectric production in small power stations was encouraged.

Later, within the process of liberalization of the electricity market started with the General Electric Law 54/1997, Spain made an effort to promote the generation of electricity by RES to cope with Kyoto's targets on emissions of $CO_2$. Competition was introduced in generation and end-supply whereas transmission and distribution remained regulated. The law aimed to reconcile the liberalization of the electricity system with the objective of guaranteeing supply of appropriate quality, at the lowest possible price and minimizing the environmental impact. Installations under the Special regime, may leave any surplus energy to the network, offer it on the market or establish physical bi-lateral contracts. The economic framework was developed by the RD 2818/1998 of 23rd December, on electric energy production by installations using renewable resources, waste and co-generation.

The White Paper of 1997 started a program to promote the use of renewable sources implementing different policy instruments. The most relevant one was the modified Aid for Electricity Generated from Renewable and Combined Heat and Power Sources, which provides incentives for new installed capacity of renewable energy sources, and requires evaluation of costs and impacts as RES gain in popularity and stringency.

The National Energy Plan 1991-2000 established an incentive scheme for production by co-generation and RES to meet 10% of national electricity production in 2000 (up from 4.5% in 1990). Within this period, Law 40/1994 consolidated the Special regime concept as such, and RD 2366/1994 defined the principles established there in. It was concerned with hydroelectric energy production, co-generation and other installations supplied by RES.

In 1999, and in conformity with EU directives, the government approved a Plan for the Promotion of Renewable Energies which included the necessary relevant strategies so that the growth of energy produced from RES covers at least 12% of primary energy consumption by the year 2010. To meet this target, it is necessary to double production of renewable energies, as the demand for energy rapidly grows. The core of the current contribution of these energies comes from hydroelectric generation and from biomass generation (95% together).

The Royal Decree 436/2004 went beyond the scope of the Special regime. Distributors were obliged to purchase all the electricity generated by RES at a fixed price. As the amount of energy generated became more important, a fraction of the total had to be traded through the pool at the system marginal price. The way the fixed price was set followed an estimation of the fixed cost of production by the regulatory board.

Currently, the regulation that sets the legal framework for the special regime is RD 661/2007 which repeals RD 436/2004. The latter maintains the basic principles with minor changes though. The targets of Directive 2001/77/CE by 2010 come into force under the new regulatory framework. At least 29.4% of total electricity consumption should come from renewable sources. There are two possibilities to sell electricity generated by RES:

- Generators can put electricity directly into the grid, without passing across the Day-ahead market, and obtain a single regulated tariff for each hour of the day. Sells are done through the market operator although offers are at zero prices in the Day-ahead market, unlike offers from other technologies.
- Generators can make offers of electricity at the price resulting from the uniform-price auction of the Day-ahead market or at the price set through bilateral contracting, with a subsidy to compensate for the higher cost of generation as compared to the market price.

The National Energy Commission settles the payment of the Special Regime and publishes a report on energy purchases which includes the most relevant information on the aforementioned activity. In December 1999, and in agreement with the EU, the government approved a Plan for the Promotion of Renewable Energies which included the necessary relevant strategies so that the growth of each of the areas of renewable energies may cover, all together, at least 12% of primary energy consumption by the year 2010.

Table 1 reports electricity supplied to the market by type of technology: We distinguish between electricity generated in thermal units and the rest, including hydroelectric and RES.

There is an average growth of 3.6% every year[2]. We observe an increasing share of electricity from RES; from 15% in 2002 to 23% 2008. When hydroelectric generation is included, the shares increase to 25% in 2002 to 31% in 2008. Thus, Spain is not far from reaching the target set by Directive 2001/77/CE.

Figure 1 plots total electricity generation, RES and thermal generation for the same period.

The trend is towards an increase in the share of RES from total electricity generation. We observe a smooth growth as compared to hydroelectric generation which relies on water availability and alternative uses. Therefore, this one is a significant result of active investment and regulatory policies towards promotion of renewables.

| | Special Regime | | Hydro | Inter- | ----------Thermal---------- | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Distribution | Market | electric | national | Nuclear | Coal-burning | Combined cycle | Oil-fired | Total |
| 2002 | 33130 | 553 | 21234 | 9413 | 60596 | 77372 | 4699 | 11398 | 218395 |
| 2003 | 32545 | 5062 | 36316 | 8115 | 59571 | 72285 | 11749 | 6217 | 231860 |
| 2004 | 35883 | 6500 | 28132 | 7814 | 61416 | 73232 | 21456 | 4779 | 239212 |
| 2005 | 25762 | 23243 | 15930 | 8676 | 55380 | 74676 | 45200 | 7844 | 256711 |
| 2006 | 6151 | 40198 | 16866 | 11708 | 54496 | 51410 | 42670 | 4394 | 227893 |
| 2007 | 0 | 57010 | 26752 | 9913 | 53120 | 69711 | 53956 | 4064 | 274526 |
| 2008 | 0 | 65574 | 20435 | 6799 | 57033 | 43519 | 82038 | 4393 | 279791 |

*Table 1. Electricity by Technologies*

Source: OMEL and own construction.

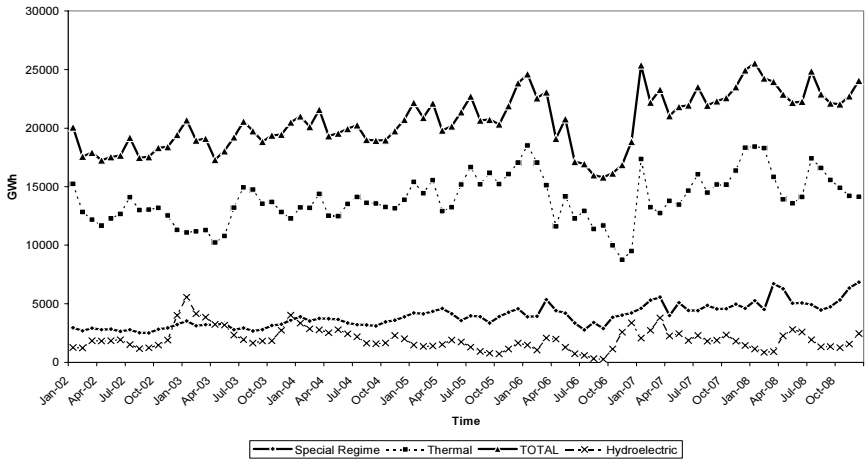


*Figure 1. Energy by Tecnhology*

**Perspectives for the Future**

Spain has made a significant effort to meet the EU targets on electricity consumption from renewable sources, as Table 1 and Figure 1 show. Technology is improving and, in the mid-term, it will be possible to further increase the presence of energy from renewable sources in the Spanish energy system, reduce system operational problems and limit the need for new conventionally generated power. But, in order to achieve this, it is essential to offer the agents efficient signs and a stable regulatory framework that allow them to adopt all these technological advances.

**References:**


1. Directive 1996/92/EC
2. Directive 2001/77/CE.
3. OMEL, Operador del Mercado Eléctrico, http://www.omel.es.
4. RD 436/2004 in Boletín Oficial del Estado 75, 27/03/2004.
5. RD 661/2007 in Boletín Oficial del Estado 178, 26/07/2007.
6. RES – E White Paper COM(97)599 final (26/11/1997).


**Footnotes**

[1] The definitions in Directive 1996/92/EC concerning common rules for the internal market in electricity are also applicable to this Directive.

[2] Note how in 2006 there was a significant drop of 11 percent in total consumption as compared to 2005. This is the result of Royal Decree 3/2006 that implied a significant decrease of total electricity through market.