The new Spanish electricity market design

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Abstract

As of July 2013 the Spanish government published extensive draft legislation (more than 700 pages) that substantially change the current power system regulation. The draft legislation mainly covers the regulated grid activities, the non-mainland systems regulation and, importantly, the renewable support scheme design as well as distributed generation regulation. It also touches on the capacity reliability mechanisms, and mandates the Spanish TSO and MO to prepare further reforms of the wholesale market. The draft legislation has already been partially approved by the Congress.

The Reform is actually a radical turnover of the Spanish regulation. The paper main objectives are to describe the Reform so far as it impacts on the electricity market, to roughly evaluate the economic impact, to assess the likely behaviour of the affected stakeholders in the new market environment, and the consistency or otherwise with the wider European regulation and targets.

Keywords: Regulation, Electric Utilities, Alternative Energy Source, Nuclear

JEL codes: Q48, Q42, L98

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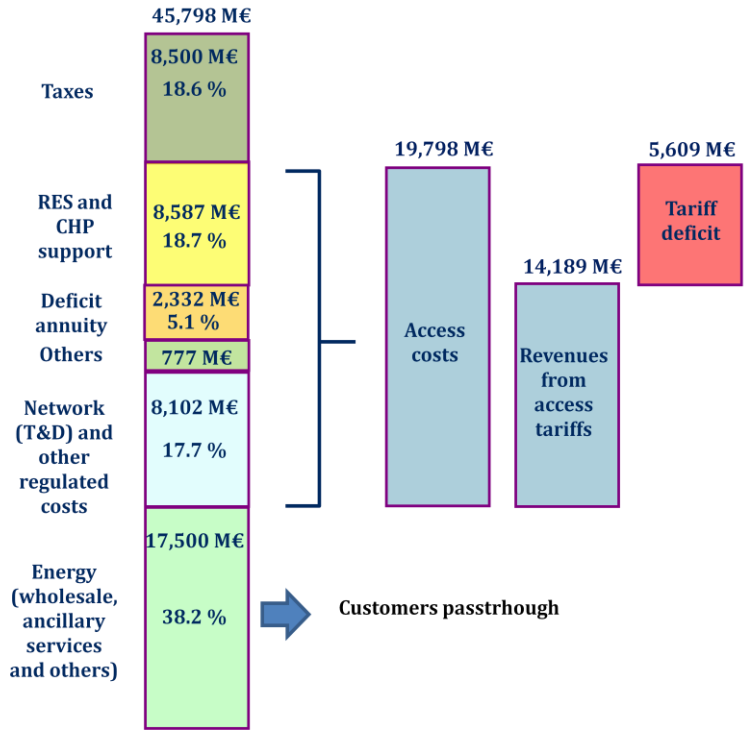
1. Introduction and background

Nowadays we are witnessing the most radical regulatory change since the market liberalization in 1997. As of July 2013 the Spanish government published extensive draft legislation (more than 700 pages). The cornerstone legislation is the new *Ley del Sector Eléctrico* 24/2013 (Power System Law, LSE in the sequel) approved by the Parliament in December 26th, 2013. A draft of the law, as well as draft versions of a number of Decrees, was made public by the government in July 2013. Some of the drafts have been already approved, and it is widely expected that the remaining draft legislation will follow suit during this year.

The new and draft legislation covers the regulated grid activities, the non-mainland systems regulation and, importantly, the renewable support scheme design as well as distributed generation regulation. It also touches on the capacity reliability mechanisms, and mandates the Spanish Transmission System Operator and Market Operator to prepare further reforms of the wholesale market.

Prior to the discussed legislation, a number of important measures were approved during the preceding years. Arguably the most relevant one was the Fiscal Law 15/2012 (approved December 27th, 2012) that promulgates new taxes on electricity production, gas and coal use, nuclear activities and use of water by hydroelectric facilities.

It is relevant to understand the Government's motivation to promote these legislative and regulatory measures. At the start of the reform the Spanish system was economically unsustainable.



The figure shows the 2012 sector accounting. Energy costs (wholesale, ancillary systems and other minor energy market concepts) are pass through to customers. Main regulated costs are T&D and, peculiar to the Spanish system, RES and CHP support costs. Specifically RES and CHP facilities are entitled to feed-in-tariffs and other regulated support schemes. The difference between the regulated revenue and the market revenue is charged as an access cost, whereas the market revenue is just as for a non-supported power plant (supported RES and CHP must bid in the market, albeit they usually do it at zero price). The payments because of former years tariff deficit are also a regulated cost (see below). In addition there are a number of regulated costs related to the support for insular demand, domestic coal and DSM support schemes, and other issues.

The access tariff that should cover access costs has been, however, significantly below the required amount. The reason has been that successive Governments have not allowed the required increases, arguably because of political reasons (electricity price is a highly sensitive issue in the Spanish political arena). The deficit remained very low until 2005. Since then it has been growing, firstly because of rapidly increasing RES support costs (notably the "PV bubble" of 2007-2008) and then also because of past deficit annuities payments. As a consequence by 2013 the outstanding electricity deficit was about 25 billion euro. The deficit is system debt to the regulated companies that have not receive all the regulated payments own to them. Most of the deficit has been consequently transferred to a State-supervised vehicle (known as FADE) charged with its securitization, although about 15% still remains in the regulated companies accounts.

The dire economic situation was the main reason to address the reform, as reliability and quality of service were and are good, the system was well in advance of the forecasted track towards the 20-20-20 goals, and because of the demand slump no major new physical assets are needed until 2017 at the earliest.

2. Prior to the reform: Fiscal Law 15/2012

After the elections on November 2011 the new conservative government approved several Royal Decrees aimed to reduce regulated payments to transmission, distribution and insular systems and, importantly, promoted a Fiscal Law that was approved by the Parliament in December, 2012.

The Fiscal Law imposed new taxes on electricity generation. Specifically:

- A 7% tax on all generators incomes. On top of that,
- Nuclear taxes on spent fuel (2,190 €/kg spent fuel, about 5 €/MWh)
- A 22% hydro tax on hydroelectric facilities income. The tax is reduced to 2.2% for facilities smaller than 50 MW and pumping stations.
- "Green cent" for gas and coal. The impact was about 7 €/MWh for coal-fired power plants and about 4.5 €/MWh for CCGTs.
- End of subsidized natural gas for use in Concentrated Solar Plants.

The aim of the new taxes was to collect about 3 billion euro per year. As part of the taxes would be pass to consumers through the market, the price differential with

France and Portugal is expected to rise (actually, futures differential Spain-France rose 2 €/MWh after the Government announcing the Law draft), and net imports to Spain to increase.

However, possibly the most commented consequence of the new Law was the relatively minor matter of Garoña Nuclear Power Plant closing. Garoña NPP is a 460 MW facility in Northern Spain operating since 1970. Initial licence authorized operation until July 2009. Slightly prior to that date, the Government authorized operation until July 2013. To continue operation beyond that date would require significant new investments. Because of this and the new taxes, the facility owners (Iberdrola and Endesa) announced that there was no business case to apply for life extension and proceed to close the plant and extract the spent fuel during December 2012, before the Fiscal Law came into force. Recently, fiscal provisions regarding tax payments on nuclear spent fuel have been modified in order to avoid payments because of the fuel burnt before January 2013. Therefore the plants owner are presently re-considering the closing decision.

3. The July 2013 announcements and the Electricity Law

During July 2013 the Spanish government published extensive draft legislation (more than 700 pages) that substantially changed the current power system regulation. The draft legislation mainly covers the regulated grid activities, the non-mainland systems regulation and, importantly, the renewable support scheme design as well as distributed generation regulation. It also touches on the capacity reliability mechanisms, and mandates the Spanish Transmission System Operator and Market Operator to prepare further reforms of the wholesale market.

Cornerstone of the Reform was the new Power System Law (LSE). The new Law supersedes the previous one (Law 54/1997). As the old one, the LSE distinguishes between market (wholesale and retailing) and regulated (transmission, distribution, supported generation and insular systems) activities. All generation whether supported or not must submit bids to the wholesale market. For supported generation market income will be complemented by regulated income. Total income for regulated activities will be set in order to provide a "sensible profitability", computed for an "efficient and well managed company", to be reviewed every six years. In the Law annex "sensible profitability" is set to that of the 10 years Spanish bond plus 3% for supported generation. The rate differential for distribution is likewise set at 1% for 2013 and 2% for 2014 onwards[2], 2% for transmission[3] and 2% for the insular systems[4]. As a reference, 10 years bond yield was 4.5% as February 2014.

The new Law set as a guiding principle "the economic and financial sustainability of the power system". In consequence, it establishes that total income (access tariffs – including all charges therein included even if do not correspond to network costs – plus eventually State budget income) must balance total cost.

[2] Royal Decree Law 9/2013 and Royal Decree 1047/2013.
[3] Royal Decree 1047/2013.
[4] Royal Decree Law 20/2012.

Maximum imbalance is set to 2% per year, and accumulated imbalances must be below 5% total yearly income. The eventual deficit must be supported by all regulated parties proportionally to their regulated income[5]. Nonetheless, special provisions ensure that the 2013 deficit was to be treated as the ones of former years.

Besides the above, the Law sets the general framework to be developed through specific regulations for several issues, as explained in the sequel. However, it should be taken into account that a significant fraction of the required regulation is yet a draft.

4. Supported generation

Under the former regulation, RES electricity (excluding "traditional hydro") and CHP facilities were entitled to receive financial support, under Feed-in-Tariff or Feed-in-Premium schemes. The new regulation changes[6] the framework to a new one based on a mix of investment and operational support. It is arguably the most innovative element of the new regulations, and one conductive to considerable controversy.

As stated above, all generation must submit bids and is entitled to whatever market proceedings it may earn. In the case of supported generation, it is also entitled to operational and/or investment additional remuneration:

- Operational additional remuneration (€/MWh) is granted whenever standard variable cost is greater than forecasted market price. Standard variable costs include fuel, insurance, network access, maintenance, carbon allowances, taxes, management costs, land rent, security costs and others. The forecasted market price is published by the Ministry. If the standard variable cost is greater than the forecasted market price, the difference is paid as a production premium.
- Investment additional remuneration (€/MW) is granted on the basis of the investment cost for a reference facility. Gross remuneration is computed, on the basis of standard variable costs, in order that the reference facility obtain the "sensible profitability" (3% over Spanish bond) as discussed above. Past market revenues and operational additional remuneration for the standard facility are then subtracted to obtain the value of the current investment remuneration (if positive, otherwise is zero). Some complex provisions deal with the case when market prices are supposedly much higher or lower than forecasted market prices.

The scheme is a sort of yardstick competition scheme, in which supported generation earns more than the reference facility if their costs are lower or its production (and therefore market revenues) is higher. The parameters defining the reference facility are therefore of critical relevance. The current Ministerial

[5] Formerly, it was financed by the historical 5 distribution incumbent companies, without a published rational for the allocated percentages.

[6] As stated in the draft Royal Decree on Generation Facilities from Renewable Energy, Cogeneration and Waste, as well as in the draft Ministerial Order establishing the parameters to be applied.

Order draft establishing the remuneration parameters lists 1,276 reference facilities. The list is particularly exhaustive for PV facilities and also CHP facilities, taking into account in the last case the relatively low number of the existing plants.

There is no public methodology and data supporting the Ministerial Order parameters, which makes criticisms difficult[7]. However, it can be checked that PV facilities are able to roughly maintain the support level prior the reform[8], that most wind facilities have their remuneration strongly reduced[9], and that CSP facilities might actually see their remuneration improved by the reform.

Besides the parameters values, there are some striking flaws in the design itself. For instance, generation taxes on investment additional remuneration (including the general 7% electricity income tax discussed above) is treated as a variable cost. In the case of wind facilities investment additional remuneration is low, and as consequence standard variable cost is well below forecasted market price and no operational additional remuneration is paid. However in the case of PV facilities investment additional remuneration is much higher. Add other cost items and standard variable cost can rise up to 80 €/MWh. As forecasted market price is about 50 €/MWh, PV facilities may receive a production premium of about 30 €/MWh lacking economic rationality[10].

Stated the above, the new remuneration scheme generally reduces production premia (€/MWh) and substitutes them by investment support (€/MW). Therefore a more efficient dispatch can be anticipated. Moreover, reference investment cost for new supported generation should be obtained out of a competitive auction, therefore guarantying more efficient investment.

5. Distributed generation and net metering

The new Law regulates for the first time self-consumption facilities, and in particular PV panels for own domestic consumption. From an economic viewpoint, given the current excess of generation capacity and the lack of network bottlenecks, massive distributed new generation (or generally new generation of any kind) seems difficult to justify on a purely economic basis[11]. On the other hand, volumetric access tariffs might make profitable for individual consumers to install own generation devices.

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[7] Little more than final values of the operational (€/MWh) and investment (€/MW) additional remuneration is provided. Some extra information is included in the Memory annex to the Ministerial Order, although it comes very short to replicate the provided remuneration parameters.

[8] Establishing a proper reference level is a controversial subject, as regulation has suffered several changes in the last years. The reference herein used is the regulation in force just prior the July reform proposal. In particular, for PV facilities the reference level includes bounds of supported full load hours. There are, for some cases, published comparisons with the generally more generous remuneration schemes at the initial investment time or at intermediate periods.

[9] For instance, wind generation installed before 2004 is not entitled to receive support.

[10] Or, at least, that seems to be the more likely explanation consistent with the scarce provided information.

[11] However, some insular systems might be an exception to this rule.

As stated above, access tariffs include mainly network charges, supported generation charges and deficit annuities. Network charges are mostly fixed, whereas the case is possibly less clear cut for the two other concepts[12]. Tariff structure is binomial, with an energy and a power term with values conditional to the voltage connection level and the possibility of time-of-use tariffs. On average, prior to August 2013[13] income for the power term was about 64% of total access tariff (50% for small domestic consumers). After that date power term means about 69% of the total access tariff (60% for small domestic customers)[14].

In any case the remaining volumetric (energy term) may distort investment decisions in distributed generation[15]. Besides, it can be argued that distributed generation also benefits from the security of supply provided by traditional generation and embedded in the energy price, outside the access tariff. Because of these reasons, the LSE establishes the obligation of separated metering of consumption and own generation, and the setting a backup tariff charging own generation.

Specific values of the backup tariff are advanced in a draft Royal Decree. Actually the advanced values (€/MWh) are computed by adding up the access tariff energy term, capacity payments, and ancillary services costs. Therefore, from the consumers point of view, generation within their own premises should be as valuable as a contract with any outside generator that may sell in the wholesale market. Nonetheless, for small consumers (less than 100 kW) no compensation is mandated for the energy feed into the network, neither any sort of additional support as the discussed ones in the preceding section.

6. Capacity Reliability Mechanisms

Capacity payments were reduced by Royal Decree 9/2013 in July 12th, 2013. A draft Royal Decree introduces further modification in the Spanish CRM. In the sequel the regulation envisioned in the published drafts is described.

There are three main components in the proposed regulation: an adequacy payment, a firmness payment and a mothballing procedure.

- The adequacy payment is presently set in 10,000 €/MW per annum to be paid to CCGTs, until the power plant life is 20 years[16] at the latest[17]. The

[12] It is not even clear cut if only electricity consumption should pay, as opposed to be paid by all energy consumption (e.g. transportation fuels) or the general State budget.
[13] In which date, Ministerial Order ITC 1491/2013 was approved.
[14] CNMC report "Informe sobre la propuesta de orden por la que se revisan los peajes de acceso de energía eléctrica".
[15] For instance, two otherwise identical PV facilities, one selling to the wholesale market and the other market devoted to own production, have different consumer value as one must burden the volumetric part of the access tariff and the other one not.
[16] The payment has undergone many changes since it was first mandated. Precise duration is conditional to the previous plant history, and changes from facility to facility. In any case the payment has been reduced since in its inception, as well as limited to a single technology from the initial technologically neutral scheme. The current value is well below of the yearly investment cost of an OCGT, a popular estimate of an adequacy payment.

draft legislation allows for capacity auctions to be held in the future. Auction demand will be determined administratively according to a 10-year forecast of the power surplus margin made by the TSO. Only new plants or large refurbishments of existing ones that include "investments in technologies critical to achieve the energy policy and security of supply objectives" would be eligible. In any case, RES & CHP with specific support would be excluded.

- Firmness payments are currently set at 5,150 €/MW times an availability factor ranging from 91% for coal and gas fired power plants to 24% for hydro and conditional to the facilities to actually generate. The scheme would be superseded in 2015 by the proposed one in the draft regulation. In the new scheme only coal plants and CCGTs would be eligible. A lump-sum will be shared among all available coal plants and CCGTs. The sum will be administratively estimated ex-ante. In addition, an ex-post downward adjustment would be made for each plant, based on the income earned in the intra-day and ancillary services markets according a complex non-linear formula. The adjustment actually implies that bids on these markets will depend on the expected firmness payments, with consequences difficult to forecast.
- The possibility of mothballing is introduced by the draft regulation. Currently, Spanish regulation mandates an availability obligation that acts as an exit barrier. In the draft regulation only CCGTs would be eligible for mothballing. In any case permission must be granted by the Administration, taking into account *inter alia* network stability issues. The TSO would determine the maximum CCGT capacity that can be mothballed and an auction would be arranged for assigning the right to mothball (i.e., who receives the permission).

Generators and demand would finance the cost of the investment incentive, availability incentive and mothballing auctions. Although not much detail has been given, the cost assigned to each generator would be inversely proportional to the availability factor of its technology (administratively defined).

Related to this issue are the provisions for "interruptible load mechanism" that benefit large electricity consumers. The TSO asks for load reductions on short-term notice in exchange for an administrative price well above (more than an order of magnitude) equivalent generation capacity payments. The new regulation substitutes the administrative price for a price set in an auction. However, the small number of participants as well as the atypical auction design might lead to collusive or inefficient outcomes.

7. Transmission and Distribution remuneration

Distribution remuneration is set on Royal Decree 1048/2013, approved on December 27th, 2013. Regulatory periods are set as six years long. The first one

[17] Most coal power plants have an environmental payment of 8,750 €/MW per annum during 10 years as investment support for control emission devices (mainly desulphuration scrubbing units) mandated by European regulations. Even if strictly not adequacy payments, they are mandated in the same legislative pieces and often confused with adequacy payments.

will end on December 31st, 2019. As stated above, remuneration rate is set as the 10 years Spanish bond yield plus a spread. The spread is set at 2% for the first regulatory period, that is, a rate of 6.5% before taxes. The Regulatory Asset Basis is explicit and based on physical units, affected by efficiency factors. Standard costs are to be used for CAPEX and O&M computations. The maximum investment to be allowed is set at 0.13% of Spanish GDP. Incentive payments for quality and loss minimization are reformed, and a new incentive payment for fraud prosecution is introduced. A critical component of the overall scheme is the specific value of the standard costs. They should be published in a Ministerial Order before during 2014, after consultation by the Regulatory Commission (CNMC).

Transmission remuneration is established along similar lines. However, asymmetries may arise when computing the Regulatory Asset Basis, as no comparable methodology does exist. Furthermore, bundling of transmission and system operation within the same company creates perverse incentives, especially regarding network expansion. Although they could be addressed through proper incentive regulation, this reform is presently not high (or even not at all) in the Government agenda.

8. Insular systems

Extra-peninsular Spanish systems[18] have a regulation in many ways unique within the European Union. Physically they are small systems [19] where market competition is not possible. Actually system operation follows the orders of the TSO (Red Eléctrica de España) and power plants are remunerated according a cost-of-service scheme. On the other hand Spanish regulation mandates no discrimination among consumers because of geographical reasons. Accordingly insular customers pay the same energy cost as the peninsular ones, and also the same access tariffs and taxes. As generation and, to a much lesser extent, transmission and distribution are more expensive in the islands than in the peninsula, a compensation must flow from the peninsular customers to islands generators. The compensation is part of the access tariff.

Even if there are not wholesale insular markets, Spanish regulation allows any company to install facilities in the islands under the same requirements that in the peninsula since Law 54/1997 (the former Power Sector Law), guaranteeing freedom of entry. Nonetheless the generators will only be paid the Spanish wholesale market price unless the TSO has declared that they are needed for security of supply reasons and, therefore, entitled to cost-of-service payments.

After approval of the Law 54/1997 detailed insular regulation was not enacted until 2006[20]. Regulation of the gas sector, that is required in order to use natural gas instead of more expensive fuels, has likewise being dragging. The considerable

[18] That is, the Balearic and Canary archipelagos and the Northern African cities of Ceuta and Melilla. Ceuta and Melilla are electrically isolated from the surrounding Moroccan territory and are to all effects "electricity islands".
[19] The greatest one, the Mallorca-Menorca system has a peak demand of 1,062 MW, followed by the Tenerife system with a peak demand of 609 MW.
[20] Ministerial Orders ITC 913/2006 and ITC 914/2006.

regulatory risk and the low remuneration rates[21] may explain why the former regulated monopolist until 1998 (Endesa) still holds today the near totality of fossil generation facilities.

During the last years peninsular electricity prices have been falling because increasing RES penetration and demand decrease, as insular generation (largely by fuel-oil generators) costs have been growing. As a consequence the amount of the insular compensation has significantly grown, reaching about 900 million euro.

Against this background, on October 29th, 2013 Law 17/2013 was approved by the Parliament. The Law introduces a number of surprising elements: it effectively forbids Endesa to invest in additional generation entitled to cost-of-service remuneration, it mandates auctions for fuel procurement that must clear below international market prices[22] and assign possibly all new pumping stations to the TSO, breaching unbundling provisions. It is therefore likely that the goal of reducing system costs is not to be reached. On the positive side, RES investment incentives are mandated in the draft regulation on renewable energy, that might significantly increase investments in the Spanish regions best suited for these technologies. However it should not be forgotten that significant obstacles remain, such as regional and local use-of-land regulations.

9. Conclusion

After the initial rush of draft regulation during July, 2013, a speedy reform process was anticipated for many, if not most observers. However the reform process has been delayed, possibly halted in some specific topics (such as net metering regulation) and put in the background by more recent events. Specifically the outcome of the auction for regulated demand supply in December, 2013; the government reaction after the fact, and the current regulation being pushed in order to substitute the former system for a new one are nowadays the more hot topic in the Spanish regulatory landscape.

Nonetheless, the Reform might be an appropriate blueprint. The Reform clearly distinguishes between "rules" (e.g. benchmark competition for RES) and "parameters" (e.g. reference RES facilities specification). Its success will critically depend on these "parameters" being defined in a predictable, consistent and fair manner, subject to public scrutiny and discussed with the affected parties.

[21] 10 year Spanish bond plus 3%, before taxes, to be decreased in 2012 to 2%.
[22] Otherwise fuel cost will be recognized below market price for generator under cost-of-service remuneration.