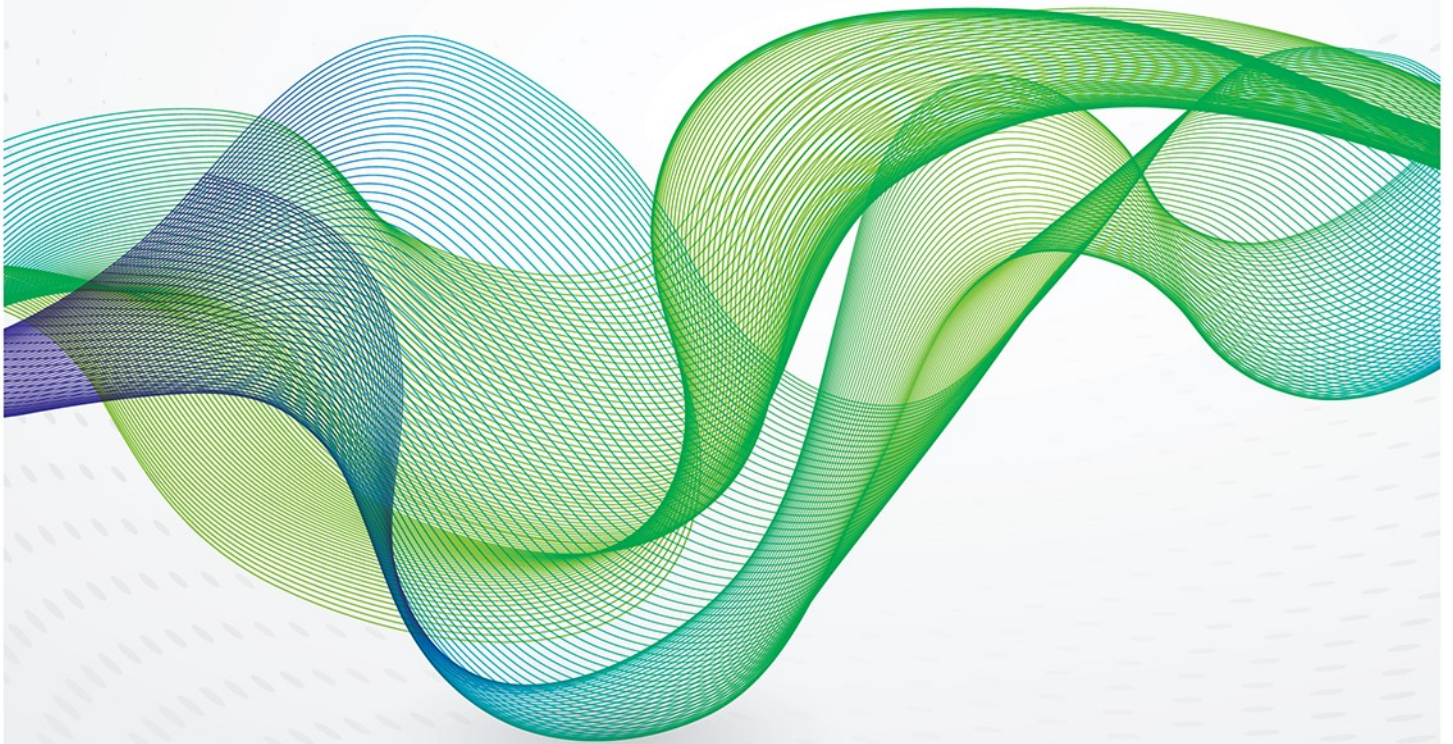


December 2013

Pulling the Plug on Renewable Power in Spain





Pulling the Plug on Renewable Power in Spain

Introduction

Spain has earned a reputation for leadership in the development of wind and solar powered electricity. However, draft legislation introduced last July¹ is the latest in a series of regulatory changes that are damaging this reputation.

To understand what is going on, one needs to explore the origins of the €30 billion tariff deficit that has accumulated since 2001. The recent legislation aims to stop that deficit from growing and to introduce regulatory stability. It is unclear whether and when Spain will achieve these objectives. However, it is clear that the legislation reduces the returns on existing investments in renewable power and discourages future investment. Owners have initiated international litigation to claim economic damages related to the change in regulations. Adding further to the uncertainty facing the sector, the government has just annulled the quarterly (CESUR) auction that determines the energy component of the last resort tariff for 17 million customers, with the Minister responsible alleging manipulation. While this decision is not directly related to the new legislation, it is further evidence of the government's willingness to intervene in the sector.

Spain's challenges in the electricity sector are an extreme and early reflection of structural problems related to European Union (EU) energy and climate change policies: problems include unsustainably high costs, inconsistency between liberalized markets and government intervention, and an obsolete market design. No EU Member State has yet defined a convincing reform path to a liberalized low-carbon electricity sector. However, there is a growing recognition that the solution requires redesigning wholesale and retail electricity markets, as well as new regulations, to reflect the growing importance of distributed generation, demand response and renewable energy.

Recently, a journalist asked me: "What is going on in the Spanish electricity sector and what are the implications of recent legislation for renewable power?" This comment consists of nine messages, organized to follow journalist's questions.

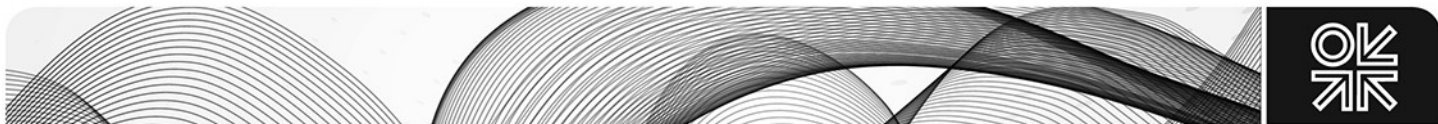
1. What do you see going on? What is the government trying to do?

Message One: the latest legislative developments are best understood as a response to the accumulated electricity tariff deficit of €30 billion. The latter is the result of the unwillingness of different governments since 2001 to pass on the full costs of their policy decisions to customers.

For almost fifteen years, the Spanish electricity system has had a revenue deficit related to its regulated activities; this is known as the "tariff deficit". It is the result of setting regulated (grid) "access" tariffs too low to recover all the recognized costs of regulated activities. These access tariffs cover not only transport and distribution network costs, but also other regulated costs and subsidies².

¹ The July legislation included a new draft law for the electric sector, as well as a number of Royal Decrees, including one that reformed the regulation of the Special Regime (i.e. renewable energy, cogeneration and residual waste) and another that regulated auto-production (i.e. distributed generation) and auto-consumption. The draft law is being passed in its final form as this Comment is being published, whereas these Royal Decrees are still in draft.

² Formally, the new legislation distinguishes between tolls (peajes) for transport and distribution networks (in accordance with EU Directive 2009/72/CE) and charges (cargos) for all of the other regulated costs of the system, including subsidies (remuneración específica) for renewable generation, cogeneration and industrial residues, capacity payments for conventional



The accumulated tariff deficit, which is really a debt, is now about €30 billion. It continues to grow and is supposed to be recovered from all customers over the next fifteen years through the access tariff. The access tariff has grown along with the subsidies and other regulated costs it reflects. It now accounts for about 55% of a typical customer's electricity cost, with the remaining 45% associated with the wholesale price of energy. In other words, more than half of a customer's electricity bill reflects regulated costs, on-going subsidies and part of the accumulated tariff deficit.

The tariff deficit became a major political issue recently as a result of two factors that accelerated its growth: 5 years of economic recession and a badly designed and expensive regulatory policy for solar energy. The recession meant that electricity demand fell more than anticipated and the recovery of the system's regulated costs required increased unit prices (per kWh). Governments of the left and the right were reluctant to raise tariffs sufficiently to keep pace with falling demand, so the deficit kept growing³.

More significantly, the mechanisms for promoting large-scale solar photovoltaic (PV) power and concentrated solar power (CSP) were badly designed. The original indicative plan was for 400 MW of solar PV; there are now more than 4500 MW of solar PV in 60,000 installations⁴. Why? Mainly because the regulation introduced a regulated payment (feed-in tariff) per MWh produced that was higher than required to induce investment, and there was no limit to the amount of PV that could receive this payment under 25 year contracts; only a deadline for when the door would shut. The result was a flood of PV projects that were completed before the door shut. A similar story also applies to CSP.

Much of the tariff deficit has been securitised, with the support of government guarantees. Although these guarantees are formally different from a cost recognized in the central budget, financial markets – where the securities now trade - recognize the guarantees as adding to the Spanish government's financial obligations. This helps to explain why the government is keen to stop the deficit from growing further.

Message Two. The current government is trying to stop the tariff deficit from growing further by raising regulated tariffs to final customers and cutting payments for regulated activities, including renewable power. This was never going to be popular. So it is no surprise that every affected interest group is complaining.

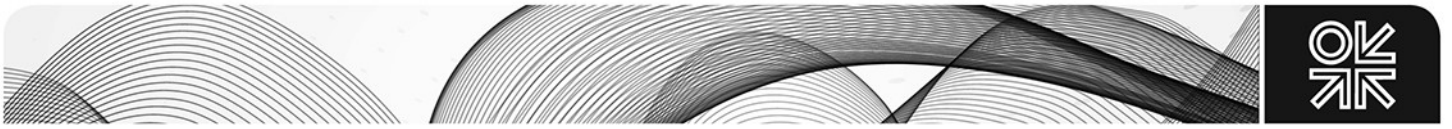
First, the July 2013 legislation aimed to eliminate the anticipated tariff deficit for 2014 of about €4.5 billion, by increasing access tariffs paid by customers (€900 million), reducing remuneration paid to operators (€1.1 billion for conventional electricity companies and €1.6 billion for renewable energy and co-generators) and drawing on the central government budget (€900 million). The government has now decided not to draw on the central budget, thereby implying higher costs for customers and/or lower revenues to operators if the deficit is to be cut to zero.

Second, the July 2013 legislation is the latest in a series of reforms that have been felt especially by the owners of renewable power. In 2010, the government imposed a transitory cap for three years on the number of hours for which PV plants receive a regulated feed-in tariff. Since then, among other

generation, remuneration of costs for extra-peninsular generation, and the tariff deficit. In this Comment, I will use the term "access charges" to refer both to tolls and charges.

3 Prices for small consumers (2500 – 5000 kWh per annum) have nevertheless risen 63% between the first quarters of 2008 and 2013, according to an article quoting Eurostat data. (El País, 18 December, 2013, page 22).

4 CNE, Informe de Supervisión del Mercado Peninsular Mayorista al Contado de Electricidad, Marzo-Abril 2013, page 8.



measures, the government: introduced a general tax (7%) on all generation including renewables and a 22% special tax on hydro generation; withdrew the premium, on top of the pool price for the output from CSP that was gas-based; and effectively eliminated the option of the “feed-in premium” scheme⁵, which had allowed renewable power companies, except for PV and geothermal, to earn the pool price plus a regulated premium.

The draft legislation published in July 2013 states that it aims to create a stable legal framework, putting an end to the frequent changes in legislation. It will affect renewable power in at least the following ways.

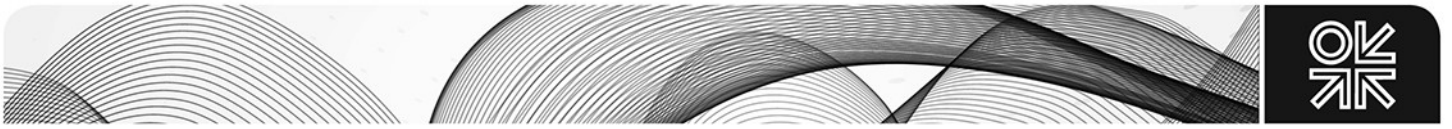
- It allows operators to earn a “reasonable return”, defined as a pre-tax project nominal return of 300 basis points above the 10-year Spanish Government bond (currently adding up to about 7.5%) over the regulatory life of the project (past, present and future). This implies that plants that obtained a higher return on their investments in the past (above 7.5%) will now be facing reductions in their future remuneration so that across the regulatory life of the plant these plants earn what the regulator defines as the reasonable return.
- The asset values on which the return is calculated are based on standard values for “efficient operation”, and these values are not yet known.
- The previous compensation scheme based on a payment per MWh produced is replaced by a “specific remuneration” that complements the energy market price and is supposed to enable the generator to earn the reasonable return on the standard asset base. The new regulatory scheme is mainly based on a payment per MW installed.
- Through these changes, large-scale renewable energy plants will be paid on a rate-of-return basis related to a standardised asset.
- Meanwhile, distributed generation will pay a new “backup” charge levied on production (MWh).

The immediate impact has been to reduce payments to existing renewable generation assets and to lower the value of the companies that own them.

Third, the government originally said that some of this year’s tariff deficit would be covered by the central government budget. However, as mentioned above, the government has recently decided against doing so. This means that an additional €3.6 billion of tariff deficit will be financed by the electric sector; it remains to be seen whether the government will guarantee that additional debt.

Fourth, the government is increasing access tariffs. Customers will be paying off the existing tariff debt over the next fifteen years through higher access tariffs. This month, the government announced that it would raise these access tariffs by 2% in January 2014. In the latest (CESUR) quarterly auction to determine the energy component of the last resort tariff for 17 million small customers, the resulting energy price was about 26% higher than in the previous quarterly auction. Added to the increase in the access tariff, this would have implied an increase of about 11% in the last resort tariffs in January 2014. However, the results of the auction have been annulled, with the Minister responsible alleging manipulation. It is extremely difficult to distinguish between anticompetitive behaviour and normal market operation in many aspects of electricity and it will be instructive to see how the courts react – if the government’s decision is challenged – and how international markets react to the intervention. Although the government’s decision is not directly related to the new

⁵ By setting the premium to zero.



legislation, it is further evidence of the government's willingness to intervene in the sector to limit price rises, and this has obvious implications for investors.

Finally, apart from reducing revenues for past investment, the government is discouraging new investment, especially in generation – largely because there is already significant excess capacity on the system. This is not just a matter of ending the subsidy regime for new renewables and cogeneration, but also introducing new costs and obligations, for instance a backup charge (*peaje de respaldo*) along with new metering and reporting requirements for distributed generation. I will return to this below in my fourth message.

Third message. The process of introducing the legislation has lacked transparency and has created confusion and uncertainty, for instance about when the deficit will disappear and whether tariffs will rise.

First, the government did not openly discuss the options (to solve the tariff deficit) with actors in the system or publish proposals that could be debated widely. Through frequent regulatory reforms since 2010, they essentially reduced revenue entitlements and sent out increasingly scary signals about what was to come.

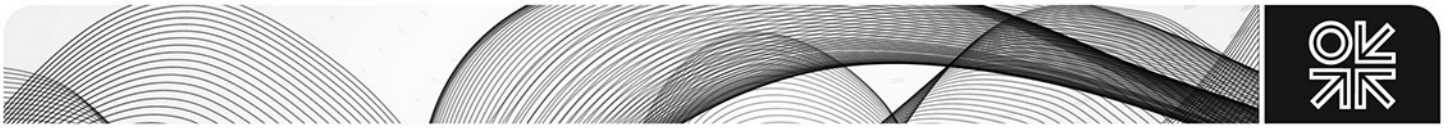
Since the draft legislation in July, all affected parties have been scrambling to influence the final legislation, including diplomatic pressure from the countries where foreign investment funds are based. But the government has an absolute majority and appears determined to pass the legislation more or less as it was written.

Second, the draft legislation leaves many questions unanswered. Although one of the key aims is to provide some certainty about future returns on assets for renewable power (and cogeneration), it remains to be seen how the government will define what it considers to be the “efficient” (or standard) plant. This decision is not straightforward and will have an important influence on a given plant's future revenue stream. Even more importantly, there is no certainty about what will be the allowed “reasonable” rate of return; the government has decided that the basis point spread above the 10-year government bond will be subject to change. Investors now renegotiating loans with their bankers face higher costs of capital due to this additional uncertainty.

Finally, in the process of introducing and passing the latest legislation, the government has issued frequent and contradictory messages: the tariff deficit will disappear this year, then it will not disappear; the government will cover some of the tariff deficit from general taxation, and then it won't; access tariffs won't increase and then they will. This has caused consternation for investors and presumably some embarrassment for the government. The latest decision to annul the CESUR auction adds one more reason for investors to question the stability of the Spanish electricity regulatory regime.

Fourth Message: the legislation introduces a new regime for distributed generation that has caused concerns for investors (consumers) and has been criticised by the Spanish regulatory and competition authorities.

The new backup charge is levied on the output of a consumer's own electricity generation. The charge varies depending on the customer's access tariff category, but is approximately 0.04-0.09€/kWh for each kWh of electricity generated on the low voltage network. Depending on the consumer, that is equal to between about a third and more than half of the variable charge of electricity purchased from the system. For instance, I currently pay about €0.16/kWh for electricity consumed (in addition to a capacity charge) and my new backup charge would be €0.0708/kWh produced from own generation. On the face of it, the consumer with solar panels already installed still



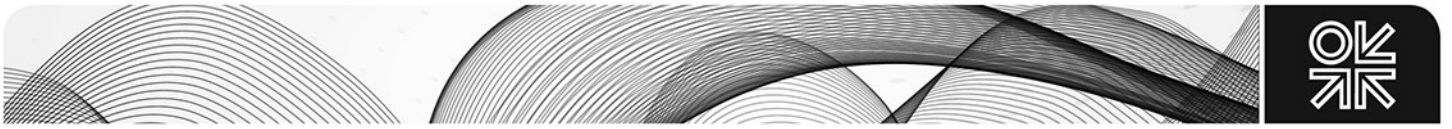
appears to be better off consuming its own electricity if the marginal cost of production is zero. Below I explain why that is not necessarily the case, why the government has chosen to introduce this charge, and why the design of the charge is problematic from an economic perspective.

What are the consequences of the backup charge for investors in distributed generation? First, this new charge will reduce the incentive to invest in distributed generation since it extends substantially the period of time for recovering investment costs. Second, owners of distributed generation now find themselves with unanticipated additional costs: to purchase and pay for the installation of 2 new hourly meters (for own generation and for own consumption) that can be read remotely; plus the time and effort to register the generation with the Ministry and sign new contracts with the distribution company and the commercialization company. Based on my own experience, the incremental costs solely for metering will be at least €1000. The owner also has to allow the authorities to inspect the premises and faces the loss of electricity service and a severe financial penalty if the facilities are not registered. Faced with these new costs and risks, some owners of existing distributed generation have decided to dismantle their facilities and it is increasingly common to hear complaints in the press about the “tax on sunlight”.

Why has the government done something so unpopular? First, they are concerned about excess generation capacity. Second, they are especially worried about the possibility that self-generation could enable owners of distributed generation to become “tax havens”, i.e. by not paying their share of the costs of the system, including the tariff deficit. The logic of the backup charge reflects a problem with the way access tariffs are designed. Since access tariffs are currently charged per MWh (i.e. per unit of consumption) but most of the system’s costs – including the tariff deficit – are fixed and sunk, customers installing distributed generation would avoid paying some of those system costs when they consumed less of the system’s electricity and used more of their own. So the government decided to levy a backup charge to recover the revenue that will be lost to the system for each MWh generated by the customer. The backup charge is therefore a payment for all the regulated costs of the system – short term and long term, including subsidies – that a customer might avoid by self-generating.

The backup tariff design is problematic from an economic perspective for a number of reasons. First, it is inefficient – i.e. it can raise costs for the system. If the customer generates one kWh of electricity from a solar panel at zero marginal cost, this will normally be cheaper than the cost of an additional kWh produced by the marginal plant on the system. So discouraging the customer from generating that kWh will mean that more expensive electricity has to be generated by the system; this in turn raises the price of electricity for all customers. And that is without considering the possible savings to the system from lower network losses related to generating at the point of consumption, or the environmental benefit of generating from a renewable energy source.

Second, a backup payment for each MWh generated by the customer is discriminatory in a number of ways. It is a charge on distributed generation that does not apply to energy efficiency improvements, even though the latter also reduce the amount of electricity that a customer buys from the system and therefore cause a similar problem for the system’s cost recovery. Furthermore, large-scale renewable generation does not contribute to the recovery of the capacity payment for conventional generation on the system, whereas the backup charge for self-generation does contribute. In any case customers already pay for the system’s technical backup when they buy energy from the system (net of their own production). The price they pay for their net energy includes not only the day-ahead and the intraday wholesale price, but also capacity payments, losses and the ancillary services related to system adjustments. For all these reasons, the new backup payment for distributed generation is a form of discrimination against the consumers who are producing their own electricity.



Third, for discouraging investment or exploitation of a specific type of generation, the backup charge is anti-competitive. The European Directive⁶ specifically identifies distributed generation as a means of contributing to energy independence, greater local security of supply and lower transmission losses. This is particularly relevant for Spain given its heavy reliance on imported fuel. Furthermore, since the backup charge is particularly relevant for solar PV and Spain has a natural advantage in the use of this technology, it does not make economic sense to increase the cost of exploiting it, especially in the case of large clients for whom electricity is an important input for their commercial activity. Distributed generation is also a direct form of competition with generation in the wholesale market, and the basis for retail companies to differentiate their retail offers. For all these reasons, restrictions on competition from distributed generation are undesirable.

Is this a fair criticism and is the design really so bad? To begin with, no regulatory authority has yet found the right answer for dealing with distributed generation, which is upsetting traditional utility business models in many countries⁷. The Spanish legislation has been systematic in thinking about how distributed generation should be metered and integrated into the system. Nevertheless, the backup charge really is problematic for the reasons given. The Spanish regulator, the Comisión Nacional de Energía (CNE), wrote a critical review of the backup charge, stressing the problems mentioned above. The Spanish competition authority, the Comisión Nacional de Competencia (CNC), was also critical, stressing the anticompetitive implications of the charge⁸. Even friends in the sector recognize that the design is problematic because it is levied on kWh produced.

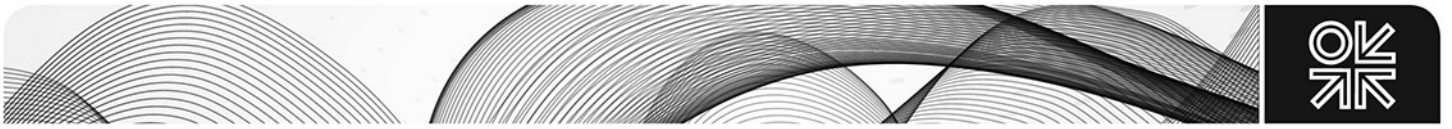
So what should be done to allow for system cost recovery without undermining distributed generation? Part of the answer is a move towards charging for fixed system costs through a fixed payment for each household (or premises), rather than through a payment per kWh. Customers would then decide whether and how much to invest in distributed generation, storage and energy efficiency improvements based upon expected savings from buying less electricity from the system at the system's real short run price, plus any revenue they could earn from selling excess energy to the system. But this answer raises other questions. For starters, how should the fixed payment be determined; should it be identical for each consuming household (which would be regressive), or depend upon contracted capacity (which requires metering), or be dependent on local marginal system conditions and expansion needs (which would be complex), or depend on some other criteria, such as ability to pay? Can the charge be adapted to demand side management, storage and other activities that might reduce the customer's consumption or reduce system costs? And if the result is to lower the kWh charge, what are the environmental impacts? In the end, some of the system's fixed costs can be allocated on the basis of sound economic principles – for instance, transport and distribution costs should be allocated to customers on the basis of their maximum capacity (kW) requirements, which reflect how the system is dimensioned to meet demand. However, the government will have to decide on the allocation of a large share of the other fixed and sunk costs, and will have to take into account many considerations, including ability to pay, efficient use of resources and not restricting competition.

The challenge of access tariff design is only one part of the necessary reform of regulations and of wholesale and retail electricity markets to incorporate increasing volumes of renewable energy – both large scale and distributed generation – as well as storage, demand response and energy efficiency. Existing markets were originally designed in the 1990's before these new energy resources were

⁶ Directive 2009/28/CE of April 23.

⁷ Malcolm Keay, John Rhys and I have co-authored a chapter in a book dedicated exclusively to the development and implications of decentralized energy resources. Edited by F.P. Sioshansi, *The Rise of Decentralized Energy Resources* is due to be published in 2014 by Elsevier.

⁸ Informe 19/2013 de la CNE Sobre La Propuesta De Real Decreto Por el Que Se Establece La Regulación de las Condiciones Administrativas, Técnicas y Económicas de las Modalidades de Suministro de Energía Eléctrica con Autoconsumo y Producción con Autoconsumo, 4 September 2013, pages 2-7. And CNC report IPN 103/13 Anteproyecto de Ley del Sector Eléctrico, pages 14-16. Since they wrote their respective reports on the draft legislation, the CNE and the CNC have been merged into a single body, called the Comisión Nacional de Mercados y Competencia (<http://www.cnmcm.es/>).



available; they are no longer fit for purpose. To date, most of the reforms in Spain and elsewhere in Europe amount to band-aids for a patient that needs major surgery. This is a challenge that requires open public debate at a European level.

Fifth message: the legislation does not really provide a long-term vision for the sector and creates confusion that may have unintended and undesirable consequences.

First, the legislation does not address longer-term issues, such as decarbonisation plans, the mix of generation, competition, the CESUR auction, or the redesign of wholesale markets to incorporate the new energy resources. For financial markets, the draft legislation is incomplete without clarity on these longer-term policy questions. I understand that the government plans to address some of these issues once it has resolved the immediate problem of the tariff deficit. The recent decision to annul the results of the CESUR auction may lead to a serious rethink about the future of the sector. This would be a welcome development, but it would have been preferable to place the new legislation into the wider context.

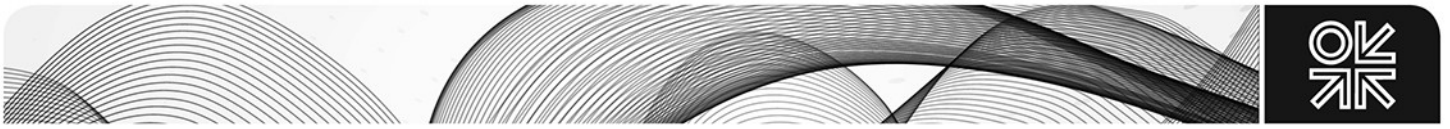
Second, the legislation could have other long-term consequences that are undesirable. For example, the changes to regulations for existing renewables (and cogeneration) have introduced a perception of regulatory risk that could well discourage investment in Spain in this and other sectors. Recently, investors in solar PV, solar CSP and wind launched international litigation proceedings to claim economic damages. Foreign investors on mini-hydro are also seriously considering launching international litigation proceedings. Although electricity investors may return when the regulatory conditions improve, this sort of litigation sends a worrying signal to potential investors in all sectors, just when Spain is hoping to attract them. By way of immediate illustration, among other conditions for investing in a casino development in Madrid, Eurovegas requested that the central government provide guarantees of financial compensation in the event of future legislative changes by subsequent governments. The Spanish government understandably decided not to make the requested concessions and the investment looks unlikely to proceed. I am no fan of Eurovegas, but their condition related to compensation for possible changes in regulation is a sign of the times. I am not arguing that regulations should never change, or that investors should assume that they never will; if regulations are really too attractive to be sustainable, a well managed company will take that into account when investing. Nevertheless, it is not good news when a country obtains a reputation for regulatory risk and that, unfortunately, is currently the case for Spain.

Third, it is possible that other EU countries will follow Spain down this path, introducing additional confusion and uncertainty about EU policy with respect to renewable energy. As explained in the last section of this Comment, Spain's problems are a particularly extreme and early reflection of a EU-wide problem related to unsustainable and incompatible energy and climate change policies.

2. Given the size of the deficit, what were the alternatives? Should the government have done something else?

Sixth message. There were policy alternatives, which would have been more transparent and efficient. Broadly speaking, there were three alternatives, apart from putting all the parties in a room and requiring them to solve the problem before they could leave.

First, the government might have chosen to increase electricity tariffs to levels that would stop the tariff deficit from rising further. Customers will respond to higher prices by reducing their consumption and investing in energy saving devices. This approach makes economic sense, provided the costs being passed through are justified. At the end of the day, however, raising tariffs by the required amount was politically unacceptable – especially given the economic crisis and the increasing



problem of energy poverty. There are also some reasonable doubts about whether all of these costs should have been born by electricity customers, as explained below.

Second, the government chose to subsidize renewable technologies partly as an industrial strategy – for instance, to establish global leadership in wind power. Some of the cost might reasonably be borne by the companies that were supported and by the taxpayer. Indeed, the government has effectively made investors pay, for instance through new taxes and lower revenue streams for wind and solar energy. Until very recently, the government had also agreed that the taxpayer should bear some of the costs. However, they have now changed their mind because the government has no spare money and would prefer to spend what it has (or to incur deficits) to finance higher political priorities.

A third alternative, which I favour, is to recognize that renewable power plants were being subsidised to meet a commitment made to the EU to increase the share of renewable energy (not just power) and to lower Spain's CO₂ emissions. A carbon tax on all carbon-based emissions would have been an economically sensible way of financing low carbon energies. It would have penalised coal, oil and natural gas, and favoured renewable energies. This solution makes good economic sense in terms of minimizing the cost of decarbonisation and could have been introduced as part of a wider tax reform⁹.

3. Some solar advocates believe the government is trying to run them out of business. Do you think that is true?

Seventh message. I do not think the government is trying to run the solar companies out of business, but it is clearly trying to discourage investment in new capacity (solar included), and to reduce the payments to the existing plants for the reasons I mentioned. All generation companies are paying the price, but investors in existing renewable power plants have a special problem to do with their level of gearing.

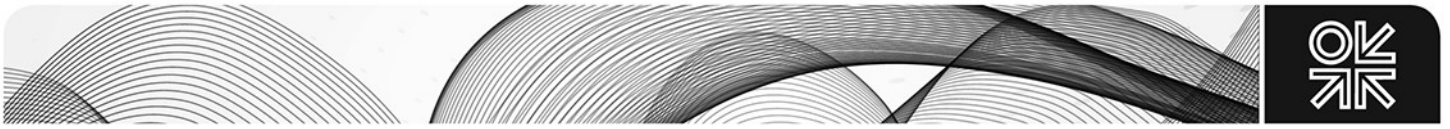
Because renewable power projects are highly leveraged, the reduction in their cash flows means that some cannot pay their interest and principal debt payments and may have to default on their loans. Banks are likely to prefer to renegotiate the payment streams with existing owners, rather than trigger default of the loans and find themselves with assets they do not want. The problem for investors is that there has been a significant reduction in the equity value of their investments and in some cases, the equity has been wiped out. In these circumstances, the question is whether investors will choose to transfer the assets to the banks.

4. Do you see the possibility that the new measures might cause unforeseen damage? (A large number of insolvencies causing problems for the banks.... owners of solar panels going off the grid?)

Eighth message. There will be damage. Although some of it is already obvious, some may have been unforeseen by the government.

First, there is already some obvious damage. The lower revenues and the higher refinancing costs for companies and individuals trying to renegotiate loans could lead to defaults. This will affect many individuals who saw solar energy as a potential retirement income, especially if they borrowed money to make their investment. The international litigation underway will also affect Spain's reputation as a safe place to invest.

⁹ For a description of the case for carbon taxes in the US, see Joseph Aldy, "The Case for a US Carbon Tax", Oxford Energy Forum 91, February 2013, pages 12-16.



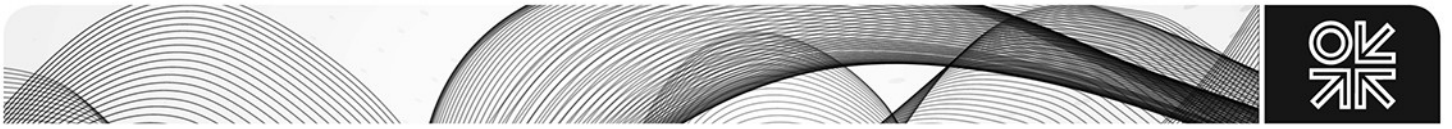
Second, large solar PV, solar CSP, wind power or mini-hydro plants are very unlikely to be withdrawn from the system, although it is quite possible that new investors will buy assets from existing owners at discounted prices.

Third, in the case of distributed generation, the legislation could lead to unintended consequences, in particular the decision to disconnect some demand from the electricity system. It is clear that physically isolated sites not connected to the network would not be required to pay the backup charge, and that generation that directly supplied a household network that itself was connected to the grid would pay the backup charge. But what about generation that supplies a network that is separate from the network that connects to the grid – for instance a garage, a separate building, a basement or other facilities? Presumably these separate networks should not pay for backup because they are not connected to the grid and do not depend on it. Assuming that this sort of self-generation would be free from the backup charge, some customers would choose to disconnect parts of their facilities from the grid. It could be argued that customers might not wish to do this because most renewables do not provide continuous supplies – and solar PV will not be functioning at times of peak. On the other hand, customers can and do store their electricity in batteries, and they may not mind the absence of electricity for certain uses when their generation is not operating. Larger customers might also provide their own backup through other forms of conventional generation or with the help of minigrids that would be largely or partly self-reliant. The design of the backup payment positively encourages customers to find legal ways of avoiding it. This is unlikely to be an efficient outcome.

5. Do these new policies cause issues for Spain with the EU?

Ninth message: I do not see this causing a major problem for Spain's relations with the EU because the EU is more concerned about Spain meeting its central budget deficit targets than about upsetting investors in renewable power. Having said that, the Spanish case reflects a more serious problem that should be of concern to the EU: namely the unsustainability and incompatibility of their energy and climate policies. Furthermore, the EU should be concerned that these policies will lead to tariff deficits elsewhere (they already exist in Portugal and France, and could appear soon in the UK) and might be resolved in a way that further discourages investment in renewables.

It is widely recognized that Spain made some serious mistakes in the design of its renewable energy regulations and that these contributed to the tariff deficit; Spain is different, as they like to say. However, Spain's problems are a visible manifestation of four structural problems facing the EU. First, EU energy and climate change policies are increasingly in conflict. EU energy policy is largely about creating a liberalized, competitive internal energy market, where forward energy prices are supposed to drive innovation and investment choices, where costs are driven down by competition and customers can choose who supplies them. Climate change policy, on the other hand, is about governments deciding which technologies to subsidize, and in particular what renewable technologies to support. This has led to a situation where intermittent renewable technologies (wind, solar PV and solar CSP with no-storage) are an increasingly important part of wholesale markets that were originally designed to promote efficient operations and allow for fixed cost recovery of conventional (mainly fossil fuel) plants. The result of the growth of intermittent renewables has been to reduce the operation of conventional power plants, and increase the frequency of low, zero or even negative wholesale energy prices, making fixed cost recovery for non-subsidized plants increasingly hard. Wholesale electricity markets need to be redesigned to reflect the increasing importance of renewable energy and to allow for fixed cost recovery by conventional plants that provide backup to the system.



Second, EU energy and climate policies have been undermined by a plethora of uncoordinated national policies. For instance, while there is a growing recognition of the need to remunerate conventional power stations through a new capacity payment mechanism, the European Commission is discouraging this largely because they expect Member States to introduce different national mechanisms that would distort the internal energy market. Member States have also been reluctant to adopt a European market for renewable energy or “green certificates”, instead adopting a range of very different national policies that raise the overall costs of meeting European renewable targets. But perhaps the biggest barrier to the creation of a single market in low carbon energy is the national choice of energy mix, and in particular whether to support (and subsidise) nuclear power. The EU needs to find more effective governance arrangements for its energy and climate change policies. Ideally this would happen for the EU as a whole, but it could start with regional wholesale markets that have common energy and capacity payment mechanisms and that integrate renewable energy and demand response. It is also high time to exploit the potential to encourage trading in renewable energy credits or green certificates – for instance Germany buying solar renewable energy offsets related to solar projects in southern European countries where the costs of solar energy are lower.

Third, EU energy and climate change policy is unsustainably expensive, but governments are reluctant to pass costs on to customers or taxpayers. The EU now has electricity costs that are substantially higher than in competing regions of the world. Some of this could not be helped; for instance the rise of shale gas in the US has driven down the cost of electricity there. But the EU has contributed to the high costs of electricity through over-reliance on government decisions with respect to the choice of low carbon technology, bad regulatory design, and inadequate integration of markets. Furthermore, there has been a reluctance to recognize the full costs of these decisions, leading to tariff deficits and the sort of legislation that has caused such consternation in Spain. The way forward is to reduce the cost of delivering low carbon energy, for instance by using technology-neutral, market-based incentives to encourage innovation in low carbon technologies¹⁰.

Finally, the Spanish policy of discouraging distributed generation may reflect a nervousness throughout much of Europe that electricity systems will go into a “death spiral” if customers start to produce their own electricity rather than buying electricity from the system. There is certainly a risk related to customers who do not pay their share of system costs; this leaves the system trying to recover its costs from fewer and fewer customers. However, the way to deal with that is to design tariffs that give customers (or their representatives) efficient signals to decide whether and when it is better to buy electricity from the system or to produce and consume their own electricity. This is part of a wider challenge related to giving customers a more active role in helping to manage the system, and allowing new business models to develop, such as aggregators that combine customers together to optimise their contribution to wholesale markets from distributed generation, demand response and storage. Wholesale and retail markets need to be reformed so that customers can play this role effectively through aggregators and through the development of smart metering and smart devices. Ironically, approaches that penalize self-generation could encourage the sort of death spiral they aim to avoid.

10 See Malcolm Keay, John Rhys and David Robinson, “Electricity Market Reform in Britain: Central Planning Versus Free Markets” in *Evolution of Global Electricity Markets: New Paradigms, New Challenges, New Approaches*, ed. F,P Sioshansi, Academic Press (Elsevier), 2013, pp. 31-57.