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Capacity mechanisms
A credibility test for the Energy Union?

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Recently, few aspects of the debate surrounding energy have been as divisive as capacity markets. After having given a green light to a capacity remuneration scheme in the UK in 2014, the EU Commission is now considering starting a sector inquiry in several member states.

This paper aims at shedding some light on what capacity markets are about and what are the EU-specific implications, arguing that the debate is ill framed within a market context still focused on conventional power generation, and making the case for a coordinated approach to solve the fallacies of the present system.

BACKGROUND

Capacity remuneration mechanisms (CRMs) allow electricity generators to receive compensation in exchange for having a backup generation capacity available, whenever it may be needed. Originally, they were created to maintain sufficient capacity to cope with peak loads in a context where prices are capped.

Europe has seen increasing interest in CRMs as the means to maintain security of supply, due to the expansion of renewables. The national support schemes for renewable energy sources (RES) as a result of EU targets have rapidly increased the share of RES in power generation, from 15% in 2005 to more than 28% in 2013. However, as long as storage solutions do not exist at affordable prices, RES continue to need backup solutions in order to provide a reliable supply.

As RES' operators are not responsible for finding alternatives when the sun does not shine and the wind does not blow, leaving the system to bridge the gap, the problem is particularly acute as RES' share grows and creates challenges to conventional generation.

RES have entered the power generation mix at zero marginal cost. This has had disruptive effects on the viability of conventional generation. As operators use the lowest-cost plants first, the merit order has given precedence to wind and solar photovoltaics in the race to meet demand, significantly displacing other plants and depressing national wholesale prices, thus compromising investments in backup capacity. Investment decisions in capacity are under further pressures due to the following factors:

Economic stagnation: the economic slowdown led to the double effect of reducing electricity demand and – as a result – reducing the emission allowances' prices from 30 EUR per allowance in 2008 to less than 5 EUR in 2014. This translated into generation overcapacity, accompanied by uncertain price signals. With underperforming carbon prices, market actors have difficulties in properly assessing the cost-opportunities of investments in generation capacity, with detrimental consequences for future supply security.

Coal spring: the combination of low carbon price and dynamics in the global commodity markets – notably the US shale gas revolution leading to coal surpluses in North America – led to a decrease of the gas-fired plants' utilisation rate. Combined-cycle gas turbine (CCGT) plants were hit particularly hard by the change in the merit order, accounting for 20 GW of capacity closed or mothballed across the EU between 2012 and 2013.

In order to confront the impact of such a perfect storm on future generation adequacy, and to avoid massive shutdowns among conventional power plants, many governments have responded by adopting or considering the adoption of CRMs. These national decisions, however, raise questions about the wider implications for the EU's Energy Union, while failing to recognise *de facto* security of supply as a shared competence.

STATE OF PLAY

Capacity mechanisms in the EU

Several capacity remuneration mechanisms exist. Different choices reflect different energy mixes, and the differentiated political sensitivity of the related power generation industry. This explains the variety of mechanisms adopted by the EU countries. Centralised auctions refer to capacity that is usually auctioned three years ahead of requirement. With this scheme, the grid operator selects resources to meet expected peak load demand plus a reserve amount. Plants bid at their cost of operation a level of compensation for the power they will provide in the future. Those bidding above the efficiency level are priced out and receive no remuneration. One of the most critical aspects of this scheme lies in the selection bias that tends to favour lowest-cost fuels, potentially leading to the survival of coal plants at the expense of CCGT plants in the context where RES will keep gaining shares – somehow acting procyclically. This system was adopted by the UK and is currently under consideration in France. Other mechanisms include capacity obligations, where suppliers are required to meet a projected peak load of its customer base. Capacity payments are common in Southern Europe, and they remunerate a declared capacity with fixed or variable payments. Strategic reserves are adopted mainly in the Nordic countries and Poland, where tenders for reserve capacity are issued by an independent agency or transmission system operator (TSO). Other countries decided to rely on "energy-only" markets, where generators are paid only for the volume of produced power, with no remuneration for idle capacity in peak hours. This is the case for those more politically committed to the energy transition, such as Germany.

What went wrong with coupling?

The EU's approach has never been supportive of capacity markets as drivers of security of power supply. The Commission's Communication on the Energy Union in February 2015 clearly stated that a functioning internal market does not need CRMs. Since the Third Energy package of 2009, the EU approach rather encouraged schemes of regional integration such as market coupling (merged national markets, such as Central Western Europe and several bilateral arrangements) and market splitting (defining a cross-border local submarket on the basis of congestion, such as in the Nordic countries), supported by interconnection. The overall rationale of these provisions is to allow overcapacity in one country to contribute to adjacent countries' demand, with the aim of i) increasing competition through the entrance of more actors by expanding the geographical extension of the operation, which also enhances efficiency as output is aggregated to serve areas larger than national markets; and ii) contributing to price stability and convergence, allowing electricity to flow across borders freely instead of depressing domestic prices and giving investors misleading signals. Setting aside the issue of different types of generation, wholesale price convergence should be easy to reach in the electricity market, especially considering the homogeneity of the commodity.

According to a 2013 analysis of the Agency for the Cooperation of Energy Regulators (ACER) based on the share of peak hours in adjacent markets, average results were around 40%, suggesting interesting potential for coupling. Regarding the performance of coupling, the evidence is not straightforward. Taking price convergence as an indicator, this proved remarkable in some cases (i.e., hours of price equality between Portugal and Spain rose from 0% in 2006 to 90% in 2012) and much less impressive in other cases (it remained flat between France and Spain, and France and Italy, over the considered period, despite coupling). The German case remains the most interesting, showing a rise in convergence with the Central Western Europe (CWE) region, since its access to coupling in 2010 was followed by a sharp fall culminating in 2013 with only 19% of full convergence in the region – a result attributed to a combination of RES and cheap coal in Germany.[1] However, despite this controversial evidence, analyses on welfare gains of market integration based on ACER simulations seem to show overall positive results, with the CWE region achieving EUR 250 mn of gains with respect to isolated markets.

If part of the explanation for coupling performance in convergence lies in the failure to channel RES-fuelled overcapacity through cross-border networks due to a limited physical infrastructure, it is also true that even if the infrastructure was there (and despite the homogeneity of the commodity), the impact of different types of generation must be considered. The patchwork of uncoordinated RES' support schemes did not mesh with an

internal market designed for conventional generation and that did not consider reliability, at a time when RES had not yet displayed a disruptive impact on the merit orders able to endanger investment decisions and future security of supply by driving prices into a negative territory, as happened in many cases.

Do capacity mechanisms hinder integration?

At this point, the risk is clear: the insufficient performance of the internal market in addressing security concerns holds as a motivation for the adoption of capacity mechanisms, which in turn risk undermining the prospects for further integration. Of course, a lot depends on how markets are designed and implemented, but the following potential market failures can be identified:

Market concentration and trade diversions. If adopted at the national level, CRMs risk raising competition issues. Capacity markets might end up being concentrated and biased towards a certain type of generators. They can discriminate between old and new capacities, or pose a particular burden to exporters. Such an uncoordinated policy raises the possibility of empowering constituencies hostile to further integration. Empirical evidence seems to confirm how a malicious capacity mechanism's design can translate into the construction of barriers to cross-border flows. In 2011, Russia liberalised its electricity market, launching a capacity mechanism to attract investment in additional power generation. The Russian system charged capacity costs to exporters, resulting in disincentives to cross-border trade despite the price differentials.[2]

Corporate capture. Capacity mechanisms are articulated around national generation capacity assessments. The closer the assessment is to national industry, the higher the possibility of capture will be. The possibility of getting biased assessments is present, considering how many criteria can enter the calculation - ranging from the impact of cross-border trade to forecasts on the national economic performance. In addition, even if the process is transparent, national regulators always have a number of stated objectives that reflect national considerations.

Harming innovation. A capacity design that keeps the wrong winners – notably obsolete and polluting plants – raises the possibility of postponing decommissioning and discouraging innovation in more efficient and clean technologies, especially in those cases where the demand-side response does not participate in those mechanisms. A demand-side response is the participation of consumers – often through the mediation of demand-aggregators – in capacity markets. This is based on a broader concept of energy security, pricing gains in efficiency and placing demand reduction in competition for remuneration with generation capacity. At the moment, a large number of countries do not allow demand-side response to enter their energy market (France, Italy, Belgium, Spain, the UK, Finland and Ireland), and this number has been growing in the last few years. The whole discourse on capacity mechanisms seems to be entirely focused on the supply side, raising the suspicion that the protection of unviable plants accounted for more than energy security concerns in the engineering of capacity remuneration design.

Cross-subsidisation. Uncoordinated capacity mechanisms can create problems for coupled markets. If a country pays a premium to strategic reserves, whilst an adjacent country recurs to auctions, the former has interest in profiting from the spare capacity of the latter – paid for by foreign consumers – thus saving on its own premium. Even if the subsequent cross-border congestion resulted in an investment opportunity, such a free ride for one party could turn this into a divisive political issue. After all, this is the same type of problem that the RES' support patchwork created for cross-border trade.[3]

Even remaining at a theoretical level, these negative externalities seem to provide arguments for at least a coordinated approach, in order to avoid repetition of the renewable support schemes' failures. A renationalisation of electricity markets by way of capacity mechanisms is an outcome that virtually no one wants but which might occur accidentally, with the whole concept of the energy union as the first casualty. How might a coordinated approach emerge, and what should it look like?

PROSPECTS

A sector inquiry has the potential of providing useful evidence for future legislation, currently expected for 2016. Flexibility in the procedure was introduced by the previous Commission, which now allows sector inquiries to target specific groups of countries and specific undertakings. Hopefully, this will shed light on the member states diverging choices in terms of centralised and decentralised obligations, and regarding the treatment of existing and new capacities. This is a fundamental step to limit selection biases and encourage a shift towards a

coordinated approach to capacity mechanisms. Ideally, a market design should include the following elements to ensure security without prejudicing further integration and climate objectives:

The adoption of a **common assessment of generation adequacy** that includes the contribution of wind and solar photovoltaics to generation requirements would be of paramount importance. Output aggregation remains the most effective way of coping with intermittency, as the more isolated RES are more intermittent in output. Ideally, such an assessment might become part of the upgraded tasks for ACER underlined by the energy union Communication. The exercise should take into consideration not only a standardised definition of what sources contribute to capacity, but also how interconnection, storage and demand response enter the picture.

According to many, the inclusion of **demand response** in capacity mechanisms is particularly difficult, notably to the extent that demand aggregators do not own the units whose load is reduced, contrary to the supply side, where remuneration is easily directed towards power plants.[4] In many jurisdictions, however, demand-side response normally takes part in CRMs, with aggregators bidding alongside power plants in auctions to meet future peak demand. Any inquiry and future legislation should focus on demand participation, especially on its cross-border dimension, as vested interests in several member states remain hostile to its expansion. This should especially go in the direction of encouraging innovation and offer some form of remuneration for energy efficiency, at a time when significant uncertainties loom on the funding horizon and which put at risk the energy union objectives outlined in this chapter.

Another option worth exploring is to **allow peak prices**, so that available capacity would be remunerated by the market and not by subsidies. This would remove the need for nationally designed remunerations. However, the unlikely inclination of the public to accept this will also need to be mitigated by interconnection in order to reduce the occurrence of peak prices.

Whatever the market design, the vision for an integrated market remains extremely dependent on physical **interconnection**. There is significant differentiation between member states' projected undercapacity over time. Several member states – such as the Netherlands, Austria and Italy – are more than safe until 2020, whilst others are already experiencing the costs of underinvestment. As such, there is varying potential for expanding the network. Cross-border capacity should enter into the capacity remuneration calculations. If physical interconnection properly accompanies coupling, CRMs have a strong possibility of becoming redundant at some point. Contrary to the efficiency chapter, electricity interconnection seems so far to be playing a major role in the Juncker investment plan, with a large number of projects already deemed eligible and obtaining the Project of Common Interest (PCI) status, giving access to the Connecting Europe Facility (CES) funding.

All of this does not depend on a sector inquiry alone. As treaties will not change, it will be up to member states to change their mindsets and accept the security of electricity supply as a shared problem in the elaboration of a modern and flexible market design for 2016, one that could finally bring RES into the system. This might come at a political cost, but the effects of yet another uncoordinated approach in the electricity market might cost both competitiveness and the environment more.

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1 ACER/CEER (2013), "Annual Report on the Results of Monitoring the Internal Gas and Electricity Markets in 2013", October 2014, http://www.europarl.europa.eu/meetdocs/2014_2019/documents/itre/dv/acer_market_monitoring_report_2014_/acer_market_monitoring_report_2014_en.pdf

2 S. Viljainen et al. (2013), "Cross-border electricity trade between the Nordic energy-only market and the Russian capacity-based market", Lappeenranta University of Technology, 20 December 2013, http://www.fingrid.fi/fi/sahkomarkkinat/markkinaliitteet/Rajakapasiteetit%20ja%20siirrot/Cross-border%20electricity%20trade%20between%20the%20Nordic%20energy-only%20market%20and%20the%20Russian%20capacity-based%20market.pdf

3 See ECJ, 1 July 2014, Alands Vindkraft vs Energimyndigheten, C-573/12.

4 Linklaters (2014), "Capacity mechanisms. Reigniting Europe's energy markets", http://www.linklaters.com/Insights/ThoughtLeadership/Energy-generation-adequacy-capacity-mechanisms/Pages/Index.aspx

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