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Eryk KŁOSSOWSKI: a functional market has to mirror physics of the grid

What is your overall assessment of the proposed new market design in electricity?

I must say that, though I hope Clean Energy for All Europeans package will trigger the needed improvements in the market design, I feel somehow sceptical it will actually manage to achieve it. Some of the proposals can be perceived as hasty steps and one-size-fits-all solutions and it will for sure have financial repercussions on the market players. There are crucial issues that must be thoroughly assessed before implementation.

For instance, I cannot grasp the reason behind the article providing there should be no differentiation of imbalance price within a given bidding zone. Why does the European Commission wish to prevent member states, NRAs and TSOs from applying locational pricing on their balancing markets?

Given the numerous statements in defence of energy only market, I have always thought that the Commission is a supporter of scarcity pricing on electricity markets. In my opinion, if any scarcity price is needed at all, it should appear on close to real time market (balancig market) and within locational and time limits that are as tight as possible.

Price peaks give certain market players opportunities to exercise their market power and earn money above their marginal cost. Hence, this opportunity window for suppliers should be open for as short a time as possible. Another argument in support of locational pricing is distribution of social welfare. If price peaks in scarcity hours were limited to certain nodes, or rather geographically confined imbalance price areas, it would result in two consequences. The first and rather obvious one is that only customers who actually contribute to the difficulties would be charged with high prices.

The second one, and probably even more important, is that these price peaks must be really high if they are to have an impact on demand side. If price peaks are to serve as signals, their burden should be significant enough, short in time and borne by a properly defined circle of customers. Spreading this burden across larger areas like bidding zones results in levelling them, literally ▶

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INTERVIEW

Eryk KŁOSSOWSKI: a functional market has to mirror physics of the grid

Eryk KŁOSSOWSKI
Chairman of the Board of Directors, CEEP
President & CEO of Management Board PSE S.A., Poland

averaging them. So as long as market architecture does not mirror physics of the grid, scarcity prices will not work. The chance that they will actually occur is limited because of such levelling. Even if they occur, they will also result in punishing customers and suppliers who should not be blamed for the difficulties. Any oversimplification will have repercussions on market participants. In fact, an oversimplification as such is the fallacy of today's markets in Europe. We, system operators, talk about copper-plate model, i.e. markets that can accommodate virtually any market transactions irrespectively of the actual physical constraints of the transmission system.

> The deepest electricity market is the one running on a copper-plate, but at the same time this is the most artificial one

However, in fact, grid constitutes the same kind of constraint for trades on the electricity market as the generation capacities. And the European Commission wishes to have the ultimate control over configuration of bidding zones and imbalance price areas. Spatial order of Europe is too serious of an issue to be decided at a theoretical level only.

Does the "Clean energy for All Europeans" package correctly define the challenges for European energy market?

I am not convinced it does. Once I read the regulatory impact assessment, particularly annexes thereto, I noticed that its authors stuck to two keywords. The first was liquidity and the second was scarcity.

Main driver of the electricity market reforms proposed by EC is to bring liquidity to intra-day electricity markets in order to enable them to accommodate more renewable energy, allow a more demand-side response and allow energy prices to reflect scarcity.

Liquidity and scarcity are articulated in the same breath, which might not be the best way of defining concepts. If we refer to good textbooks on microeconomics or industrial organisation, we will read that liquidity in its microeconomic sense requires the fulfilment of three criteria.

The first one is that transaction costs should be as low as possible, and this means that ask-bid spread should be tight. Secondly, market should be deep and the meaning of this is the market's ability to absorb significant volumes of trade without adverse effects on prices.

Thirdly, market should be resilient, which means prices should return reasonably quickly to their equilibrium following random shocks that caused their sinking or surging. I may be am wrong, but a market which meets these criteria, should not give rise to formation of scarcity prices. The deeper the market, the lower the chance of scarcity prices occurring.

The more liquid the market, the lower the risk of prices either soaring or sinking because such sharp changes are due to liquidity contraction. Contrary to what is assumed in the Commission's legislative package, what we can do to reflect such scarcity is to make the markets thin. This is an idea of locational pricing – either way: by means of nodes or small enough pricing zones – you try to limit the depth of the market to its actual physical limits, without artificially inflating its depth.

The deepest electricity market is the one running on a copper-plate, but at the same time this is the most artificial one. As a matter of fact, artificial liquidity of the wholesale market comes at the costs of extensive redispatching actions, applied by definition on detailed locational level. If Commission's credo expressed in the documents may have any meaning, we should separate liquidity of forward markets and scarcity prices on real time markets. If we consider day ahead as a forward market, application of locational pricing on the real-time balancing market can be the means of achieving the goals set forth by the Winter Package.

> Prices are being artificially averaged out and everybody wonders why scarcity prices do not occur

However, the package does not address some of the fundamental distortions present on the en- ▶

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INTERVIEW

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ergy markets and instead can provoke new ones, even more severe than those already existing.

What is the main distortion of the energy market and what can be done to achieve its proper functioning?

Number one is of course copper-plate assumption and lack of locational prices. Artificial pooling of liquidity on the zonal wholesale market, without considering the underlying physical reality of power system operation, leads to re-dispatching, countertrading and similar out-of-the-market operations undertaken by TSOs to ensure technical feasibility. There is simply way too much cash and power flow taking place outside the market in a highly opaque manner.

As a result, prices are being artificially averaged out and everybody wonders why scarcity prices did not occur. How can we expect scarcity pricing if at the same time there is whole lot of transactions with the sole purpose of preventing price peaks?! All of these distortions are manifested in a mismatch between commercial and physical flows of energy across the synchronous systems.

Lack of flow based capacity calculation and allocation gives rise to physical flows not corresponding to those one could estimate based on outcome of market clearing processes. A culprit number two is massive subsidising of renewables combined with relieving them from balancing obligations and privileging them with priority dispatch. It is against this distorted background that the European Commission comes up with new legislative measures that can even deteriorate the situation.

TSOs will be prevented from purchasing reserves and energy needed for balancing and congestion management within a single step, as it used to be a practice in centrally dispatched system. This will force TSOs to do this in sequential, separated procurement processes, resulting in suboptimal decisions and the risk of exercising market power by dominant players. Going further, the idea of maximising interconnection capacities by use of massive re-dispatching might not be the brightest proposal.

In August 2015, the Polish TSO consumed all available re-dispatching capacities in the region of Central Europe and despite this it was not possible to ensure any import capacity on its interconnectors from Germany. Combined with scarcity situation in Poland the result was obvious – load shedding announced by TSO and a political scandal. As long as electricity trade disregards physics and topology of the grid, such policy will result in reoccurring brownouts and blackouts.

How can security of electricity supply be achieved?

If we stick to zonal market design in Europe, coordination of cross-zonal capacity calculation and allocation is the first

Eryk KŁOSSOWSKI
Chairman of the Board of Directors, CEEP
President & CEO of Management Board PSE S.A.

and fundamental condition. Flow-based allocation of the interconnection capacities in the Continental Europe is a must.

Number two is the relevant coordination of remedial actions like re-dispatching and countertrading on par with coordinated use of phase shifters. Number three is fair costs sharing of remedial actions, which, as a consequence, will be a disincentive preventing from hazardous decisions taken by certain TSOs inside the zones, which under zonal market design are always possible, in spite of the above coordination actions between the zones.

These are necessary steps that should bring some order to the market.

All of them are already required by the Third Package and none of them properly completed. In the short term, the recent legislative package complicates the mar and does not provide clear security guarantee within the long term horizon. Regional capacity assessments and other solutions whose only purpose is hindering any form of support for those market players which actually contribute to the security of supply, i.e. conventional plants, are for sure not the best answer.

EUROPEAN COMMISSION

Introductory remarks on the Clean Energy Package

Dr. Klaus-Dieter BORCHARDT
Director, Directorate B – Internal Energy Market
Directorate-General for Energy, European Commission

By contributing to this CEEP Report dedicated to Market Design, I am reminded once more of the privilege of dealing with such issues at this moment in time.
Whether you are sitting in a regulatory authority, an energy company or a civil society organisation, there has probably never been a comparably exciting time to be looking into how our energy markets should be designed.

After all, you would need to be blind to ignore the changes our energy markets have been undergoing. In a relatively short time span, we have in fact been able to shift from a highly centralised and concentrated electricity system to one where competition and market integration are becoming the new normal.

Meanwhile, the increasing penetration of variable and decentralised renewable energy is pushing us further towards cooperation; not out of empty principle, but because it makes sense from an operational and a from a market-efficiency perspective.

And as we move forward, we see past challenges merging with new ones. Technological advancements coupled by a common political European will, have placed us on a path to decarbonisation.

Surely, that is also putting some burden on our electricity system to make the energy transition a success, and for that to happen, our Market Design must be up to the task. After all, a successful energy transition can only take place with the right market and organisational incentives, and never against them.

It's in this spirit that we have tabled a proposal for updated Market Design rules in November last year, as part of the European Commission's larger Clean Energy Package.

Our proposal is aimed at further boosting the competitiveness and security of our electricity markets on the way to decarbonisation. Despite laudable advancements in energy market integration and competitiveness, today's market incentives do not in fact always adequately encourage market participants in a way that is most efficient from a system-wide perspective. This includes poor market competition at retail level, with consumers not being allowed to use technical innovations such as smart grids, smart homes, rooftop solar panels and storage.

In addition, we are seeing some member states recurring to national measures to tackle perceived threat to security, which can potentially lead to disintegration and welfare losses for all involved. Notably, uncertainty about sufficient future generation investments is leading to uncoordinated capacity mechanisms costing consumers unnecessary money. Such mechanisms are often designed without taking into full account the capacity easily available across the border. Equally, member states sometimes fail to take into account cross-border availabilities when preparing and managing crisis situations, thus increasing the risk of domino effects.

To address these challenges, the Market Design initiative is seeking first and foremost to make markets do what they are best at: letting flexible prices signal scarcity – in both time and geography – and the corresponding need for investments.

In so far as prices are not allowed to reflect the real value of electricity, the incentive for effective commercial decisions by market players will either be absent or misdirected. Equally, by ensuring all technologies - including renewables - gradually shoulder market responsibilities, this will give us a clearer picture of what the underlying value of the technology is and where the investments should go.


Dr. Klaus-Dieter BORCHARDT
Director, Directorate B – Internal Energy Market
Directorate-General for Energy, European Commission

This does not just cover how prices are set, but also how systems are run: an integrated market connected by an integrated grid needs rules for the common operation of the grid. This is of course not something new-born out of the blue: developing common grid rules have been an ongoing endeavour for some years, culminating with the adoption of a common European Network Codes and Guidelines.

Equally, many Transmission System Operators across Europe have come together overtime in regional, voluntary initiatives that go beyond minimum legal requirements. It is high time that we give adequate legal recognition to such initiatives by encoding them in legislation and giving the resulting regional operational groupings a clear mandate and tangible responsibilities.

Last but not least, we would expect any gains from increased competitiveness and better market operation to be both a cause and consequence of higher consumer involvement.

As our latest energy package strives to make it clear by its title, we are convinced that a clean energy transition can only take place if it is inclusive. It is, after all, a package "for all Europeans". But this is also a package "by all Europeans". What I mean here, is that we should do our best to bring as many stakeholders and consumers aboard the energy transition.

On the consumer side, our newly introduced set of rights aim at changing an older paradigm whereby consumers were seen as merely passive recipient of electricity; this is no more either technologically or economically viable. On the back of rising variable renewable generation into our grids, anything that makes demand flexible is a bonus, and we should encourage it on every end of the spectrum.

To conclude: ultimately, whether you look at it from the retail or wholesale level, market design rules should recognise and reward value where this is due. If we do all the steps right, we will be ferrying Europe towards an ever more competitive, secure and clean energy future.

POLICY

The Clean Energy Package. Taking stock of the market design and RES proposals

Marco GIULI
Policy Analyst, European Policy Centre

Last November, the European Commission issued a defining set of proposals for the Energy Union process. The Clean Energy for All Europeans is a holistic package that includes reform plans for the electricity markets, renewable energy, efficiency, and governance, which are to be implemented incrementally. The package is a step in the overhaul of a European energy system in light of challenges imposed by the decarbonisation agenda.

Where do we come from?

Over the last decade, the EU focused its actions on breaking barriers to integration of the electricity markets, with mixed success. However, the energy packages adopted until 2009 reflect a supply-centred energy system based on conventional generation. Changes that occurred in the meantime were stimulated by binding national renewable targets, the rising intra-EU interconnectivity, and the technological change allowing consumers to take a more dynamic role in this process.

In light of these developments, the current model is under strain. Subsidised RES deployment, barriers to decommissioning old plants and weak demand have led to overcapacity, depressing price signals to investment in low carbon generation. Governments responded to the double need to achieve decarbonisation and supply security through a patchwork of national support schemes, potentially compromising cross-border trade. Trading arrangements are not optimised for the short-term adjustment required by the intermittence of RES-based generation. Consumers are often unable to take advantage of technological opportunities to actively participate in the market, and are therefore a missing ingredient to add the flexibility that the system needs.

The political momentum provided by the Energy Union process and the Paris agreement gave the Commission a political window of opportunity to cautiously advance a process of coordination in the electricity system in order to solve the above-mentioned problems.

Clean energy for all Europeans

A market-based approach. The package calls for energy-only-market, where wholesale prices would provide undistorted signals to investment and unleash the potential of demand side adaptation through unregulated price fluctuations. Ideally, this would even reach a point of removing the need to remunerate capacity and RES deployment. However, as market structures along the energy value chain remain quite concentrated, tariff liberalisation should be accompanied by tough competition enforcement in order not to turn peak pricing into abuses of dominant positions in disguise.

Europeanisation through regionalisation. The package suggests that the policy approach to the current challenges of decarbonisation and security should be eliminated at the regional level.

Despite a need for clarification, it is possible to identify the intention of shifting competencies from national regulators (NRAs) – which were so far the main counterparts to TSOs – to Regional Operational Centres (ROCs), which are expected to become the main TSO partners with reference to coordinated capacity calculation, determining the regional reserve capacity, security analyses, and procurement of balancing services. NRAs will maintain monitoring powers vis-à-vis the ROCs, but coordinate between the States in each region. This introduces some elements of Europeanisation beneath the surface, as in the future the Commission might reassert control of these bodies in case operations reveal a need for further centralisation.

A consumer-centred package. Consumers are the target group of the package. Taking into consideration the opportunities unleashed by technological developments to make demand side contribute to the flexibility needs of the system, the package addresses consumers as proactive actors producing their own electricity or remotely adapting their consumption patterns on the basis of price fluctuations, and calls member states to remove any obstacles and fight discrimination.

A level-playing field. An underlying philosophy of the package is to restructure the markets on a non-preferential basis. New RES installations will be deprived of priority dispatch, whilst prosumers, energy communities, and demand side response will have full access to organised markets. Everyone will be subject to balancing obligations. Both RES support schemes and capacity remuneration will be open to cross-border tendering. However, state aid guidelines remain the driving principle for the design of support scheme, so that the EU competition authorities are not giving up these prerogatives to more autonomous EU energy policy.

Beyond the power sector. Recognising the poor performance of RES deployment in cooling and transport industries, the Commission calls for governments to increase the RES share in HC by 1% per year as of 2021, and for suppliers to offer increasing amounts of advanced biofuels and other low-carbon transport fuels – somehow to the detriment of conventional biofuels which have been at the core of the transport industry's decarbonisation efforts so far. These are welcome steps to slightly reduce the adjustment burden of utilities – still, they require significant policy changes at national level.

Conclusions

The Clean Energy Package incrementally introduces elements of flexibility and Europeanisation, updating the software and fixing the details rather than working on the big picture. In the long term, further adaptation might be required as decarbonisation advances. In the short term, two main challenges are present. First, the package's success is extremely dependent on meaningful carbon price signals being delivered in a cost-effective way and tackling overcapacity. Unfortunately, it is all but obvious that the EU Emission Trading Scheme (ETS) will achieve this purpose. Second, despite a very timid and largely symbolic approach to restrict access to capacity remuneration to coal plants, harsh political reaction emerged in countries more dependent on coal, which signaled the intention to jeopardise the political process. As such, a quick delivery should not be expected.

LEGAL PERSPECTIVE

Revised rules for RES in the new electricity market design

Weronika PELC
Legal adviser, partner
Wardynski & Partners, Poland

Maroš Šefčovič, Vice President of the European Commission, in charge of Energy Union and Miguel Arias Cañete, Commissioner for Climate Action and Energy presenting the Clean Energy for All Europeans package, 30th November 2016. © European Commission

The Commission rightly points out with its Clean Energy package that the energy market was designed to reflect energy generation model stemming from 20th century, i.e. "centralised, large scale fossil fuel-based power plants with limited participation of consumers". Proposed legal measures aim to take advantage of new technologies and rapid development of renewable energy sources to redesign the energy market. The future of the market is development of self-generation (prosumers, energy co-ops, and other forms of dispersed and local generation) and ensuring that final off-takers may adjust their energy consumption to real time price signals. This should allow the elimination of "backup" generation and thus do away with unnecessary costs.

The EU Commission believes that while there might be temporary capacity problems in individual member states, they may be solved through grid integration, more interconnection and trade at the EU level. Innovative technology (renewable energy sources, demand side response, energy storage, more interconnection and market coupling) should provide adequate price information and flexibility to choose the best energy supplies available at the moment of taking a decision. Grid operators will be able to manage not only the supply, but also the demand side (through adequate price signals) and benefit from new solutions such as electric vehicles, energy storage and smart grids.

The EU target for renewable energy in total energy consumption has been set to reach 27% by 2030. There will be no obligatory or binding targets imposed on the member states. However, each member state will be required to declare its target in an Integrated National Energy and Climate Plan. National targets declared for 2020 are the minimum contribution of member states to the EU target for 2030. The annex to the proposal for Regulation on the Governance of the Energy Union defines a general framework for integrated national energy and climate plans. Each member state must produce such plan for 2021-2030 period by the 1st of January 2019 and draft plan to the Commission by the 1st of January 2018. The draft will be subject to discussion between the Commission and member state which will be obliged to include the Commission's recommendations. Such plans will be adopted every ten-year period and will cover all five dimensions of the Energy Union. The plans will have to contain not only a member state's planned share of energy from renewable sources, but also trajectories for each sector's share of renewable energy in energy consumption and trajectories for each renewable energy technology. The plan, inter alia, will also have to include targets related to a 40% reduction of greenhouse gas emissions as compared to 1990. Each state will be required to report on progress in its implementation every two years. Under the Regulation ▶

proposal, in case of "insufficient ambitions" or "insufficient progress" towards UE targets, the Commission will take measures at the EU level. One of the measures which may be applied should the trajectory for the renewable energy target not be met, is making a financial contribution to the financing platform set up at Union level, contributing to renewable energy projects, and managed by the Commission.

The Commission appreciates that not all member states have the same options to develop renewable energy sources and the costs of such new investments may vary in various member states. The objective is to develop renewables at the lowest possible cost to the final consumer. Therefore, the proposal for a revised Directive on the promotion of the use of energy from renewable sources will require that at least 10% (and after 2025 – 15%) of the newly supported capacity will be located in another member state.

Support schemes for renewables should avoid market distortions and take into account grid constraints and supply and demand of electricity. In other words, a situation where renewable energy is produced and fed into the grid even though this creates congestion or additional high costs to the off-takers should be avoided. Provisions of the Directive that provide for priority access of renewables to the grid are to be deleted.

The total electricity produced from renewable sources shall include the quantity of power produced by self-consumers and energy communities. Statistical transfers and joint projects between member states will continue to be possible. Member states will be able, voluntarily, to join their national support schemes.

Member states will be required to provide sufficient predictability to producers of energy in renewable sources by announcing support schemes for the following three years that will allow the producers to ascertain both supported capacities and budgets.

The directive provides for simplification of the renewable energy sources permitting process. This will require that single contact points be created at which each applicant will be guided through the complete renewable energy source permitting process and will ultimately receive a legally binding decision. The permitting process should cover all permits to build and operate. Under the proposed provisions, such permitting process shall not exceed three years. Considering the complications in the standard permitting procedure applicable to renewable projects, the issuance of all required permits to build and operate within three years would be a major step forward in developing a renewables friendly legal framework. The proposed directive lacks details, but it implies that such simplified procedure managed by one administration contact point, would apply to all permits, thus will probably include environmental permits.

New provisions on renewable self-consumers are proposed. Self-consumers are both individuals and legal persons who generate power for self-consumption, but may also sell excess power to the grid up to 10MWh per household and 500 MWh per legal person annually. Self-consumer installations may be managed, operated and installed by third parties.

Under the proposed definition, a renewable self-consumer may be any active customer for whom storing, selling or generating renewable energy does not constitute primary commercial or professional activity. According to national legislation, such self-consumers should not be treated as energy suppliers. Under the proposed definition, the self-consumer category is much broader than the "prosumer" definition. The clear purpose is to encourage self-consumption and waive all professional energy generation related permitting and reporting requirements. The proposed definition does not include limitations for installed capacity. The only limitation applies to sales to the grid. The new provisions also include a definition of renewable energy community which shall be an SME or a non-profit organization in which at least 51% of the shareholders or members are individuals or entities representing local interests. Such community may not install more than 18MW of renewable capacity in electricity, heating, cooling or transport per year (average annual capacity based on five years).

The proposed Directive includes measures promoting renewable energy in heating and cooling, including district heating and cooling. The purpose is to encourage member states to increase heating and cooling from renewable sources by at least one percentage point every year. Member states are also required to introduce non-discriminatory measures for access of heating or cooling produced from renewable energy sources to district grids. District heating or cooling operators may refuse access to renewable heating or cooling suppliers only if there is no capacity due to availability of cooling and heating supplies from other renewable sources, from waste or from high-efficiency cogeneration. Customers of the district heating or cooling systems should be allowed to disconnect or switch to other suppliers if they produce from renewable energy sources or from waste.

In regard to biofuels, bioliquids and biomass, it must be ensured that they meet sustainability and greenhouse gas emissions saving criteria.

While the Commission continues to strive for cleaner energy and limiting the energy sector greenhouse gas emissions, it now focuses its energy on decentralised renewable energy production, self-consumption and on relieving small producers from unnecessary administrative burdens. While support systems remain a valid option, renewable energy sources should be promoted also by simplifying permitting procedures, predictability of support, the ability to benefit from cross-border schemes and the increase of renewables share in district heating and cooling.

The Commission believes that direct financial support is no longer a primary way of stimulating growth in renewables. The renewables share will grow anyway if only energy markets implement and use new technologies enabling transfer of clear price signals in real time, reaction to such signals on the demand side and use of full EU market potential cross border, rather than allowing each national state its own capacity backups.

POLICY

Market impact of the large-scale deployment of renewable energy

Michal DLUGOSZ
Climate and Energy Policy Analyst
Central Europe Energy Partners

Currently, the share of renewables in the electricity generation of the EU is equal to 25%.
This volume is estimated to increase to 50% by 2030. If the current trend is to be upheld (which is almost certain), European power sector will need to accommodate intermittent RES and establish a new stable and sustainable paradigm of the electricity system. Undoubtedly, increasing the share of RES is a positive trend which can trigger technological development and provide new business opportunities. It should be recognised however, that its impact on the current model poses challenges for functioning of both wholesale and retail market.

Wholesale market

Massive installation of RES alters market 'merit orders' currently based on the rising marginal cost of generation, which distracts price signals. The fact that RES marginal costs are equal to zero, combined with their dependence on public subsidies schemes, determines that RES does not respond to market price signals and depresses wholesale prices. Furthermore, inflexible generation (large scale wind power or PV) can affect possible overcapacity of generation, leading, in extreme cases, to negative wholesale prices.

Hence, as shown in the graph, introduction of large scale RES into market 'merit order' excludes from it more expensive generators (using fossil fuels). This process undermines their income and thereby market position. Further on, it affects their capacity to invest and poses further challenges of maintaining necessary adequacy and reliability of electricity supply, which illustrates the "missing money" problem. It is particularly important as conventional generation is necessary to backup RES generation in case of unfavourable weather conditions.

This negative outlook is further reinforced by both, relatively low demand on energy and the anticipated increase of costs of fossil based generation caused by costlier EU Emission Allowances.

Such process may be perceived as an example of "disruptive innovation" - widespread use of RES ultimately leads to the establishment of a new market with changed value network and eventually disrupts existing market functioning rationale by altering the established patterns of business activities. This forces incumbent companies to adapt to changing conditions and opens business opportunities for new entities, be it RES-related segments of industry, aggregators operating between consumers and wholesale markets or self-consumers.

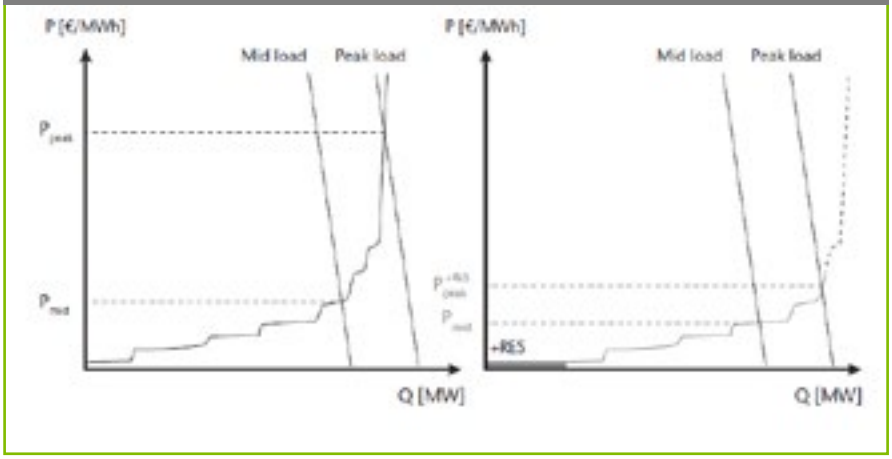
Retail market

Most of RES capacities are connected directly to distribution systems, forcing Distribution Systems Operators (DSOs) to change their role and to manage significantly more complex data in order to guarantee stability of grids. This requires a massive roll-out of smart technologies (smart grids, smart meters, sophisticated software systems), which poses significant investment costs for DSOs.

Decentralisation of generation is accompanied by a changing role of electricity customers. This may be exemplified by both emergence of self-consumers and energy communities, which will be able to produce and sell electricity. Active consumers are at the core of a 'demand side' response, a concept enshrined in the EU legislation on new electricity market design. It assumes that consumers would adjust their demand depending on the market price signals they receive.

The interface between users and utilities would be 'aggregator' entities responsible for fostering effective demand side response. Its emergence as a new market player may provide new business model opportunities. Issue of utmost importance for the retail markets and customers will be the design of support schemes for renewables.

Figure 1. Impact of RES on market merit order



Source: G. Brunekreeft, M. Buchmann, R. Meyer, New Developments in Electricity Markets Following Large-Scale Integration of Renewable Energy, in M.Finger, Chr. Jaag (eds.), The Routledge Companion to Network Industries, Routledge Companions, 2016, p. 45.

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POLICY

The Clean Energy Package. Taking stock of the market design and RES proposals

Recently, in countries with high degree of intermittent generation like Germany, despite low wholesale prices, retail prices have vastly increased. It was a result of "feed-in" tariffs use, the cost of which was transferred to consumers. This problem illustrates well the current challenges RES deployment faces: the main cost of RES investments is related to risk dependent cost of investment loans – lack of financial support would result in slower and costlier expansions of RES. On the other hand, expensive schemes would affect consumers, exacerbating negative phenomenon like energy poverty. Therefore, taking into account increasing maturity of RES technologies, it is inevitable to introduce more market based schemes which will be economically viable and less distortive to the wholesale market (for example flexible sliding premium price tariffs providing support dependent on wholesale market price).

Conclusion

As many experts underline, old market design reached its end, as it fitted the twentieth century technologies. The real challenge posed by massive deployment of RES lies in the necessity of development of a new, sustainable and reliable market model which will reflect cross-cutting changes. Ongoing transition is to be facilitated by the EU "Clean Energy for All Europeans" package which includes legislation proposal on new electricity market design and renewable energy. New market model establishment is particularly important as the power sector, in order to comply with climate objectives of the EU, must generate tremendous investments in order to replace ageing infrastructure and adjust to a decentralised electricity generation.

EPSO-G

Interconnections of energy markets – nice to have or an increasing must?

Rolandas ZUKAS
CEO of EPSO-G, Lithuania

In almost every forum, once the topic of energy market interconnections is touched upon, professionals stand firm and speak the same language – modern and reliable energy infrastructure is the key to allow energy to flow freely across Europe, when and where it is needed. It is a non-debatable argument. It helps to diversify energy sources and routes, offering advantages to both the market and end consumers.
However as soon as power or gas supplies become limited, we see that countries are tempted to protect their national interests first. Some refuse to export power in order to secure the day-to-day operation of their own power systems and uninterrupted process of consumption, and only afterwards, if there are supplies leftover, help the others.

This highlights the importance of the pan-European effort to remove national barriers for power and gas and integrate the markets in order to bolster energy supply stability and security that all of us claim we are striving for. But are we?

For the time being, the biggest hindrance to integrating the markets appears to be a lingering political distrust between the countries, which is the main obstacle we must overcome. Today when time moves faster than ever, all of us in the energy sector have no other option than to work closely together in order to tackle shared strategic energy challenges and take advantage of the opportunities as well.

In this respect, we are very strong advocates in assisting the EU in its legislative moves towards further diversification of energy routes and sources particularly across the Central and Eastern Europe and Baltic countries.

Proof positive example

Our support of this idea does not come out of the blue. We are a proof positive example of a country which benefits from cross-border energy cooperation. EPSO-G, Lithuania's state run holding of electric energy and gas transportation systems, has long been looking for efficient ways to diversify from what it used to be historical dependence on monopoly of gas supply from the East and isolation of its electricity and gas networks from the neighbouring European markets.

The situation has changed dramatically over the past 18 months, after Lithuania welcomed the arrival of "Independence", a floating liquefied natural gas (LNG) import terminal, which marked the end of the country's reliance on gas supplies from a single source. This event positively affected gas prices for the consumers and businesses. We experienced the same phenomenon after the construction of the under-the-sea energy bridge connecting Lithuania and Sweden, NordBalt,

as well as electricity link with Poland were finished. Both of these opened the market for more diversified electrical energy supply, created more competition and provided lower prices for end-users. To put it in numbers, thanks to the new options, the wholesale electricity prices in Lithuania went down by 13%year-on-year, the amount it takes to build and furnish at least 14 modern primary schools in just one year!

At the same time, these positive developments on the local market exposed the importance of diversification not only of energy sources, but also the routes that would contribute to the energy security and build trust across the Baltic countries as well as Central and Eastern Europe.

All of the above strengthened our belief that when we consider energy infrastructure, our approach must go beyond national lines – be it gas or electricity. We believe that efficient cross-border cooperation can open new energy delivery options for producers, suppliers and consumers, and also help each neighbouring economy to better utilise its national assets.

Redefining relationships

Good interconnections in electricity markets can redefine relationships with the neighbouring countries. We appear to have no other choice than to invest into cross-border electricity interconnections since they lower the risk of electrical black-outs, reduce the need to build new power plants and improve the management of variable renewable power sources like solar and wind in the countries involved. It also boosts the security of electricity supply and helps us integrate more renewable energy across the continent, so that our children can live in a cleaner environment as renewable electrical energy produced in one country can be sent to another one, with high demand for electricity, via interconnections.

> When we consider energy infrastructure, our approach must go beyond national lines

Additionally, interconnected infrastructure makes it possible for businesses and end consumers to buy and sell electricity across the borders, connecting currently isolated electrical systems, and adding to the security of supply. When a power plant fails, or during adverse weather conditions, we need to be able to rely on our neighbours to be able to import the electricity we need.

Of course, cross-border interconnections and infrastructure are expensive, but the benefits to the economies - be it businesses, environment or end consumers - are well higher due to the economy of scale.

Deeper integration means will and skill

The recently announced Clean Energy for all Europeans package by the European Commission calls on the member states to open cross-border capacities for trading, thus maximising the economic benefits for all market players, and triggering decreases in electricity prices for end users. However, this means that deeper integration of internal electricity markets will require both political will and professional skill to define new policies, which will ensure competitiveness and security of supply that is indispensable in modern societies.

This should be considered not only a national obligation, but a key pillar of European energy policy. Energy strategies of the interconnected countries must be aligned, new opportunities must be explored by more cooperation and better understanding of the neighbours' strengths.

Deeper market integration also calls for new policies on competitiveness. Long-term price-hedging instruments need to be introduced, particularly for large consumers. Energy strategies of the interconnected countries must be aligned and new options explored, that will involve national political will.

On top of that, a long-term and sustainable solution must be found for ensuring competitiveness of new power generation regardless of the fuel used. Currently, traditional generation competes with the RES secured by subsidies, therefore we all are made to compete on the market which is currently distorted by the subsidies.

To summarise – coordination between power grids and market integration will bring along more interdependence for all operators, markets as well as the countries. However, when everything is taken into consideration, we believe that better coordination of the resources and strategies will also bring more synergy to the consumers across the borders.

We recognise that energy business has an impact on the environment and we work hard to understand, measure and manage our environmental footprint and to contribute to clean energy transition in Europe.

At the same time, we also feel that while going ahead towards this worthy goal we must strike a right balance of action.

Last, but not least – we must ensure regional cooperation among EU states. One good example of this at the EC level is the Baltic Electricity Market Integration Plan (so called BEMIP). However, as we move forward, we must look beyond its limited scope and take upon a bigger challenge – to synchronise the Baltic states with Continental Europe and facilitate their efforts to work according to common European rules and practices.

By implementing the above-mentioned project, we will prove the efficiency of yet another tested cornerstone of the Energy Union - that efficient regional cooperation is feasible and vital.

PGE

The position and function of DSOs in the new market design

Katarzyna RADZEWICZ
Expert, Strategy Department
PGE Polska Grupa Energetyczna S.A., Poland

Almost two hundred distribution system operators ("DSO") currently operate on the Polish energy market. Five of them, belonging to the biggest capital groups operating on the market, have been fully unbundled.
The Clean Energy for all Europeans Package ("Clean Package"), will have crucial impact on future DSOs' activity in Poland and beyond.

The key components of the Clean Package, essential from the DSOs' perspective are: the proposal for the regulation on the internal market for electricity and the proposal for the directive on internal market for electricity.

The recast of the directive and regulation makes good progress towards reflecting the new, extended role of DSOs. The changes proposed by the Commission in the directive promote increased significance of the DSOs in tasks relating to assuring security of the system. It is closely connected with a new approach to ancillary services taking into account the local markets (grid flexibility). The future methodology of contracting local ancillary services should take into account the specifics of the electric power sectors of particular countries and be reflected in the regulatory model. New regulatory framework also incentivises the DSOs to procure flexibility services through the market and in consequence DSOs can become more active players in the electricity system management.

The scale of challenges in energy security brought upon by the full integration of unstable distributed generating sources and dynamic development of electro-mobility results in the need to consider, in the directive, provisions for the possibility of DSOs using energy storage facilities, i.e. their installation in the system and their management. Operation of storage facilities by the DSOs, which would be integrated with the distribution network, would allow for reduction of capital expenditures on network modernisation in the future and would influence reduction of local overloading of the distribution networks. This is of particular significance when higher network overload occurs only over periods of time. This is why limiting the operations of the DSOs concerning energy storage for system operation needs is unjustified. The DSOs should be able to use their own energy storage facilities as network elements for both technical and cost optimisation of fulfilment of their obligations, e.g. concerning the security of supply and quality of electricity.

At the same time, the obligation maintained in the directive for the DSOs to apply the requirements of unbundling, ongoing supervision by the national regulatory authority over the operations of the DSOs and the obligations related to fulfilment of the TPA principle, provide a guarantee that operations of the DSOs related to the use of energy storage facilities will be fully transparent and non-discriminatory. Due to the above, the limitations concerning DSOs' actions in scope of energy storage for purposes of operation of the system should be removed from the proposal for the directive.

Due to the specifics of electric power sectors of individual Member States, the issue of extent of DSOs operations concerning the recharging infrastructure for electric vehicles should be decided upon on the national level. It is thus unfounded to limit (from the EU law level) the possibilities to conduct such operations by the DSOs. Therefore, the revised directive should not be implemented in this respect.

Among the new solutions concerning smart metering (SM), the directive provides for determination of the mandatory functionalities for the SM (as a minimum standard for the member states); introduction of entitlement for final customers (on request) to have a smart meter installed or upgraded, on conditions defined in the directive; the obligation to assure interoperability with consumer energy management platforms, or introduction of a new implementation timeline for the SM.

Rollouts of the SM in Poland and throughout the world are based on the PLC technology (vast majority of them). Such rollouts assume simultaneous installation of meters for all customers in an area. They also minimise ▶

Source: PGE

per unit cost of investment (subsequently reflected in the distribution tariff). Individual installations of smart meters, instead of an area based rollout, require the use of other transitional and significantly more expensive technical solutions, the cost of which would be borne either by the requesting customer or all the customers using the system. Bearing this in mind, the proposed solution is doubtful, both from the technical and economic point of view.

Further analyses are also necessary with respect to the proposed mandatory functionalities of meters and the procedure of introducing new solutions in the context of costs and possibilities of their implementation in individual areas, while taking into account the status of investments in this respect. The new provisions should expressly state, among others, what impact will the new functionalities have on the SM projects that have already been implemented. This refers in particular to the requirements for the SM to meet the European standards.

There are at least two layers in the range of smart meters implementation, first is the energy sector, the second are the customers. To utilise all the opportunities that smart meters offer, and for a smart grid to achieve functionality in the energy sector takes time, regulatory, technical and organisational changes. Similar situation is present on the client side: the clients should be interested in using most of the smart meter possibilities. Only successful solutions, generated with respect to both these layers, mean that the full implementation of smart meters will bring appropriate benefits. Activity on the client side, besides changes in regulatory and technical area, is also affected by the list of customer priorities. Building of a list of such priorities depends on medium income, which is very different across EU countries.

Innovation is crucial to support the transformation of DSOs' business models. The dynamic development of the new technical solutions is one of the pivotal elements of DSO's operation today. DSOs play a key role in implementing innovative ideas to improve the functioning of electricity distribution networks and to develop smart energy systems with the ultimate goal of benefiting customers. Therefore, DSOs should be provided with appropriate incentives to implement the necessary innovative initiatives to support the transformation of the DSOs' business models. The appropriate remuneration for implementation of these initiatives should therefore be guaranteed for DSOs.

Management and utilisation of smart grid is exposed to many risks in the field of cybersecurity. The cybersecurity threats necessitate implementing changes in DSO's organisation, therefore the ICT function, notably in range of cybersecurity, should be developed inside of DSO structure from now on.

The regulation acknowledges the prominence of DSOs in energy transition as well. It sets out, in particular, high-level principles for distribution grid tariffs such as cost-reflectiveness, fair cost allocation and incentives for efficient grid usage. However, there is still a necessity for guarantees of respecting the specifics of the DSOs in the grid operation rules, and when defining tariff methodologies, on the regional and European levels. In difference to the transmission systems, the distribution systems are characterised by strong diversification both in individual member states and within specific member states on territories of operation of individual operators. Such specifics require introduction of appropriate guarantees of respecting existing differences and development of non-discriminatory solutions, among others, at the level of European DSO grid operation rules and guidelines defining the methodology of distribution tariffs applied.

The recast of regulation is also aiming to establish a new European organisation representing the DSOs, modelled on ENTSO-E. The proposed principles of operation of the new entity, including the participation by individual DSOs and industry organisations, should be refined in further detail, taking into account the specifics of individual DSOs, such as scale of operations, or being subject to unbundling or not.

Moreover, the proposed provisions assume voluntary membership in the entity associating the DSOs, which with the number of DSOs operating throughout the UE may make it significantly more difficult to agree on a consistent position reflecting the views of the DSOs and the specifics of individual markets. It is important to, on one hand, assure broad representation of the DSOs and on the other, not to paralyse the functioning of the new entity. It seems it will also be necessary to elaborate clear parities of representation of the DSOs from individual member states. In comparison to the transmission systems, the distribution systems are characterised by strong diversification both in individual member states and within specific member states on the territories of action of individual operators.

Such specifics require introduction of appropriate guarantees of respecting existing differences and development of non-discriminatory solutions, among others at the level of European DSO grid operation rules and guidelines defining the methodology of distribution tariffs applied. Hence, emphasis has to be placed on appropriate application of the principle of subsidiarity. Setting new rules at the European and the regional level should apply exclusively the circumstances where the competence of national regulatory authorities proves to be insufficient. The above guarantees should be directly confirmed in the regulation or in the directive.

Member states should be provided with real influence on creation of European grid operation rules in parts concerning the DSOs and guidelines pertaining the DSOs. In this scope, the minimum of appropriate consultative rights should be assured for the regulatory authorities and member states in the process of elaboration of such acts. Therefore, it is necessary to take into account the positions of the member states in development of Europe-wide grid operation rules and guidelines applicable to the DSOs.

Increasing the Commission's decision rights concerning grid operation rules and guidelines on operations of the DSOs should be accompanied by emphasising the position of the national regulatory authorities and other stakeholders at the same time.

In such situation, the Commission's decisions should, each and every time, address in what way the Commission takes into consideration the remarks submitted by individual member states. The proposed modifications of principles of elaborating and amending the grid operation rules and guidelines, including the increase of decision rights of the European Commission implemented with delegated acts, shall take into account the important consultative role of energy regulatory authorities and of the member states in the process of elaborating the grid operation codes and guidelines, at least to the extent currently in force in the comitology procedures.

PSE

Regional Operational Centres (ROC) and the risk of operational security

Paweł ANTOS
Chief Specialist, Department of Strategy and International Cooperation
PSE S.A., Poland

In order to meet the challenges coming from changing European electricity market, TSOs responded by establishing new frames of cooperation within regional coordination. In effect, two regional security coordination initiatives (RSC) were voluntarily set up, enabling TSOs to optimise the operation of interconnected power system, especially in the context of reducing costs of remedial actions. System Operation Guideline (SOGL) imposed on all EU TSOs the obligation to become part of a respective regional security coordinator, thus legally institutionalising RSCs.

The European Commission, while presenting its Clean Energy Package (CEP) noted and acknowledged TSOs initiatives as having the capability to improve market functioning and to reduce costs significantly. In EC's opinion, in areas where fragmented and uncoordinated national actions could negatively affect the market and consumers, mandatory cooperation should be imposed. EC proposes that such cooperation should be accomplished as common platform of Regional Operational Centres (ROC).

ROC close-up

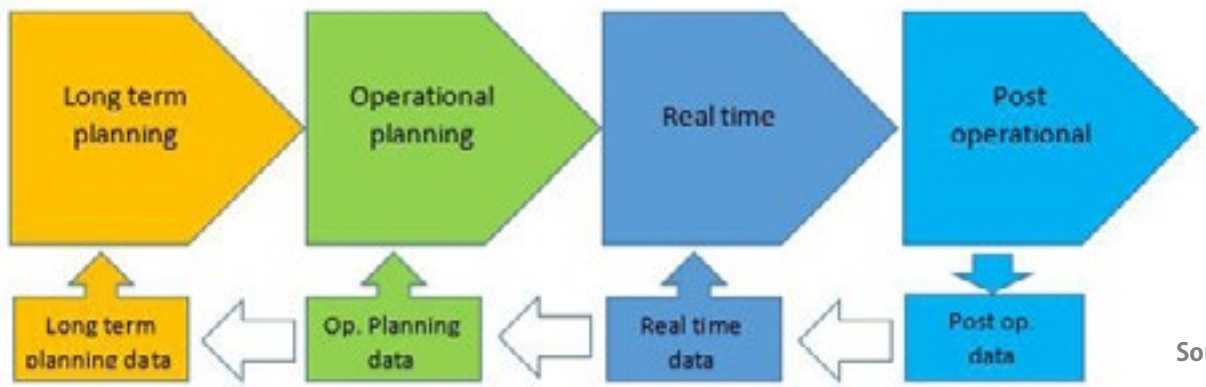
Proposal for Regulation of the European Parliament and of the Council on the internal market for electricity is a key regulation of the Clean Energy Package, i.e. it defines roles and responsibilities of ROCs. According to this proposal, all transmission system operators shall establish regional operational centres in the form of a legal entity, within the territory of one of the member states of the region where it would operate. Geographically, ROCs will cover regions defined by ENTSO-E taking into account existing regional security coordinators and on the basis of:

- the grid topology;
- the synchronous connection of the systems;
- the size of the region, which should cover at least one capacity calculation region;
- the geographical optimisation of balancing reserves.

The ROCs are intended to perform at least the following functions:

1. coordinated capacity calculation;
2. oordinated security analysis;
3. creation of common system models;
4. consistency assessment of transmission system operators' defence plans and restoration plans;
5. coordination and optimisation of regional restoration;
6. post-operation and post-disturbance analysis and reporting;
7. regional sizing of reserve capacity;
8. facilitating regional procurement of balancing capacity;
9. egional week ahead to intra-day system adequacy forecasts and preparation of risk reducing actions;
10. outage planning coordination;
11. optimisation of compensation mechanisms between transmission system operators;
12. training and certification;
13. identification of regional crisis scenarios if this task is delegated by ENTSO-E;
14. preparation and carrying out of yearly crisis simulations in cooperation with competent authorities;
15. tasks relating to identification of regional crisis scenarios if and to the extent they are delegated to the regional operational centres;
16. tasks related to the seasonal adequacy outlook if and to the extent it is delegated to the regional operational centres;

Power system management process chain with the feedback data flow



Source: PSE

17. calculating the maximum entry capacity available for the participation of foreign capacity in capacity mechanisms.

It is important to note that ROCs are intended to issue binding decisions addressed to the TSOs in respect of (i) coordinated capacity calculation, (ii) coordinated security analysis, (iii) creation of common system models, and (iv) calculation of the maximum entry capacity available for the participation of foreign capacity in capacity mechanisms. To carry out the intended ROC functions, Transmission System Operators would need to provide it with all necessary data. Regulatory authorities may jointly decide to grant additional binding decision-making powers to the ROCs for TSOs to implement, except in cases when the safety of the system might be negatively affected.

ROCs are going to be governed and monitored by management boards composed of members representing the transmission system operators and of observers representing the regulatory authorities of the region. Representatives of the regulatory authorities would have no voting rights.

Main concerns

Implementation of regional cooperation based on ROCs scheme raises concerns in regards to the risk of operational security.

1. Introduction of ROC functions is substitutive instead of complementary while splitting the decision making in operation, which leads to blurred or even conflicting responsibilities. Transferring responsibilities, important as it stands for security of supply, from TSOs to ROC may be considered as inconsistent with subsidiarity principle and might be treated as unacceptable interference in national responsibilities in the area of energy security.

From the operational perspective, the proposed model ignores the local conditions, which are relevant for ensuring security. ROCs will surely lack the deep knowledge of the system and their decisions might be based on limited information and models. Different supply regimes, system services acquisition and finally the dispatch model are subjects that are almost impossible to grasp by ROC.

From the legal perspective, there is a significant uncertainty concerning liability towards different national systems and asymmetry between customers from the country where ROC is established and other customers. Parties affected by ROC decisions might be insufficiently protected by law and their claims improperly directed.

2. Delegating the decision making to different entities for different time horizons within one process is unjustified from technical perspective. Artificial division of the process will downgrade its quality by lowering effectiveness of operational planning and ex-post analysis, thus threatening security of the process during real time operation. Splitting the process will also disturb the feedback data flow. Jointing points of responsibilities between ROC and TSO are probable points where conflicts of interest might appear and synergy effect might disappear.

Power system management process chain with the feedback data flow

Reserves sizing for all TSOs in the region is supposed to lower the total reserves thus lowering costs for their acquisition. However, a lower amount of reserves creates a risk that the region will not be able to withstand large disturbances. The global trend is to build large generating units, and growing share of RES implies simultaneous changes of amount and locality of power output, depending on weather conditions. Insufficient amount, improper location or lack of specific type of reserves threatens stability of power system if the cost of reserves is decisive factor.

Size of the region covered by ROC should be at least one capacity calculation region. Under this condition, any ROC would cover large portion of power system with its complexity and uncertainty. Operational security analyses on such scale will be possible only by simplifying the analyses. This may result in estimated results, which are basically useless in critical situations.

Finally, cost efficiency of ROC establishing is negative. Highly qualified staff, IT hardware and software, data bases, logistic, legal and financial services would have to be provided both for ROC and TSOs. For instance, the proposed EC regulation assumes that TSO would reject ROC decision if it might negatively affect safety of power system. To achieve that, TSO has to conduct the same processes as ROC does, which makes one of them redundant.

ROC or RSC

TSOs noticed the challenges coming from cross-border exchange growth and integration of large scale RES. Facing the importance of mutual coordination, TSOs voluntarily created Regional Security Coordination initiatives in order to obtain:

- coordinated security analyses;
- outage planning coordination;
- common grid model creation;
- capacity calculation;
- Short and Medium Term Adequacy assessments.

Currently, there are three RSCs in operation: TSC, Coreso and Nordic. Establishment of other RSCs is in progress. Years of experience proved that current formula of TSO regional coordination is effective. Decisions on implementing the solutions proposed by RSC remains within TSOs and that is coherent with the rights and responsibilities to conduct homogeneous process of ensuring security of supply for consumers that ultimately fall upon the TSOs. Rejection of ROC on one hand and maintaining and development of the RSC regional cooperation on the other is justified from a perspective of subsidiarity, material responsibility, cost efficiency and secure operation of the power systems in Europe.

REPORT

The role of capacity markets. How can they stimulate the incentives for investments?

Michal DLUGOSZ
Climate and Energy Policy Analyst
Central Europe Energy Partners
Summary of the report "Capacity Market as means to avoid blackouts", PKEE 2016

One of the most debated subjects covered by the proposal for the Regulation on the Internal Market for Electricity are provisions regulating establishment and functioning of capacity remuneration mechanism (CRM). Opinions about necessity of these instruments vary around European continent. Their opponents claim that introduction of CRMs is contrary to EU's 'energy only' market model, thereby disrupting its functioning and subsidizing outdated dirty generation capacity. Supporters of this solution, voice that with increasing penetration of intermittent sources of energy, CRM is necessary for addressing adequacy concerns to guarantee the security of electricity supply and to cover soaring investments needs.

All in all, representatives of the European Commission are avoiding conclusive opinions, reiterating that decision on the establishment of national CRMs should be considered as a 'last resort measure'. A basic document in this regards is conducted in 2015 study 'Final Report of the Sector Inquiry on Capacity Mechanism' SWD (2016)385, which investigates currently functioning mechanisms existent in 11 member states. The report communicates that a precondition for CRMs establishment should be implementation of electricity market reforms, namely implementations of measures allowing scarcity pricing and facilitation of demand side response. It concludes however, that in cases of certain market deficiencies which hinder reliability of supply, CRM may be introduced as long as it is implemented according to EU rules on state aid and accepted by the EC. Report calls for harmonization of different national rules on adequacy assessment which negative outcome is enabling possible introduction of CRM.

According to Article 2.2. u of the proposal of Regulation: 'capacity mechanism means an administrative measure to ensure the achievement of the desired level of security of supply by remunerating resources for their availability not including measures relating to ancillary services'. According to article 23, member states have a right to introduce capacity mechanisms to address their individual adequacy concern. This provision also contains contentious 'emission performance standard' excluding from possible capacity power plants emitting 550 g CO2/kWh. Furthermore, in order to guarantee objectivity and comparability of different national assessments, the EC foresees use of European Adequacy Assessment based on the ETNSO-E designed common methodology. To avoid decoupling of national markets Regulation also provides a set of rules facilitating inter-border participation in CRMs.

Design of the CRM may vary (currently there are 35 different types of CRMs in application), however its main purpose is the same – to provide additional revenue for capacity provider. As rational market players, energy companies undertake investment decisions on the basis of expected revenues. In this context, CRMs are an important factor stimulating future investments, therefore addressing member states concerns about long term ability of the market to incentivise sufficient investment

The problem with assuring sufficient generating capacity volume in electricity systems affects many regions in Europe and around the world. The risk of power outages has sparked a public debate on effectiveness of the single-commodity market (EOM – Energy Only Market) and the cost of potential electricity supply interruptions for end users.

Therefore, CRMs may be regarded as a remedy for structural problems of European wholesale markets. Large-scale integration of renewables into the market results in decreased wholesale prices, which in return pushes traditional generation out of the market and undermines its profitability and limits investments. As a consequence, the revenues generated by conventional units do not fully cover their CAPEX and OPEX. Global literature refers to the drop in profitability of conventional energy sector as the "missing money" problem. Long-last-

Design of the CRM may vary (currently there are 35 different types of CRMs in application), however its main purpose is the same – to provide additional revenue for capacity provider.

CONTINUED

REPORT

The role of capacity markets. How can they stimulate the incentives for investments?

ing low profitability of the electricity sector leads to subsequent problem referred to as "missing capacity" – investors refrain from building new capacities even in the face of forecast short- and medium-term insufficient capacity reserves in the National Electricity System.

Introduction of capacity market creates conditions allowing for long-term investment decisions to be adopted, therefore limiting market risk. At the same time, capacity market allows for coordination of investment efforts within the National Electricity System and adjusting them to fit the actual system needs. This allows avoiding over- and under-investment situations, as market participants know in advance what investments of key importance to the National Electricity System will be implemented.

With improved predictability of the market and stabilisation of revenues, financial institutions will be more willing to provide financing of ambitious investment programmes. It is worth noting that capacity market makes it possible to build new conventional capacities in the "project finance" formula, which is not possible in the current situation. This means that implementing capacity market brings down some of the market entry barriers and makes the market more competitive.

To conclude, capacity market is a tool allowing fulfilment of the goals of national energy policy, particularly in the area of modernisation of existing and construction of new generating capacities, as well as stimulation of development of the DSR. Without introduction of the capacity market, initiating capital intensive investments will become extremely difficult. Assuming continued current low profitability of the sector – it will be virtually impossible.

CAPACITY MARKETS

COMMENT

Michał SMYK
Director of Strategy Department
PGE Polska Grupa Energetyczna S.A., Poland

Market experience shows that 'energy only market' (EOM) cannot provide adequate incentives for investing in new dispatchable generation assets.

The investment appetite decreases with the growing regulatory uncertainty and disruptions that adversely affect the present energy market model.

The key reason for deteriorating profitability of conventional energy sector is the rapid growth of heavily subsidised renewable energy sources in recent years.

This is due in particular to the drop of wholesale prices (not to be confused with customer prices!) and decrease of operating time of conventional units which makes it extremely difficult to recover all operating expenses and raise the necessary funds for new developments and modernisation investments. The drop in profitability of conventional energy sector is often called the "missing money" problem. The long lasting low profitability of the electricity sector leads to a subsequent problem referred to as 'missing capacity", which means that investors withdraw from new investments. As a consequence, this may endanger the adequacy of the energy system. Introducing capacity market allows creating conditions for long term investments by limiting the market risk. With improved revenue predictability, by introduction of a market in which dispatchable capacity is contracted apart from energy, the financing also becomes more available and cost-effective. Therefore, it is also postulated that such an approach guarantees not only the required level of system adequacy, but also reduces the cost of energy to the end user.

ARCELOR MITTALL

The enhanced role of consumer from the point of view of energy-intensive industry

Mirosław MOTYKA, Director & Grzegorz PIZOŃ, Steel Advisor
Arcelor Mittal, Poland

Energy pricing is of paramount importance for competitiveness of companies in the energy-intensive industry, such as representatives of steel sector. Many different public encumbrances associated with the use of energy and lack of external pressure on pricing mechanism makes energy one of the most important cost items in balance sheets of industrial consumers of electricity in Poland.

As far as data provided by Eurostat is concerned, the final end use of energy in the EU-28 in 2014 indicates three dominant categories: transport (33.2 %), industry (25.9 %) and households (24.8 %) . The survey shows that ¼ of all energy consumed in the EU within the specified period was used for the purposes of manufacturing goods.

Unfortunately, the data on electricity pricing is not as precise, as statistics provided by Eurostat do not take into account the situation of the specific group of the biggest electricity users.

According to the report by the biggest power company in Poland (Polish Energy Group), prices of black electricity in Poland are currently the highest in the region (PGE annual report for 2016). The reasons of this situation will be elaborated upon further in this article.

Polish regulatory environment and surcharges added to the price of energy are also of crucial importance, as some of them (nor similar ones) do not exist in other jurisdictions, or are present, but with significant exemptions or releases benefiting energy intensive industries. From another point of view, the overall European tendencies and views expressed, inter alia, in the Clean Energy for All Europeans package, including proposed future regulatory framework of internal electricity market, define energy intensive recipients as one of the major players in forthcoming changes. However, it is uncertain, whether recipients in such countries as Poland, in which both black energy and gross electricity prices are significantly higher than in other ones, would have resources and impetus to play the planned role.

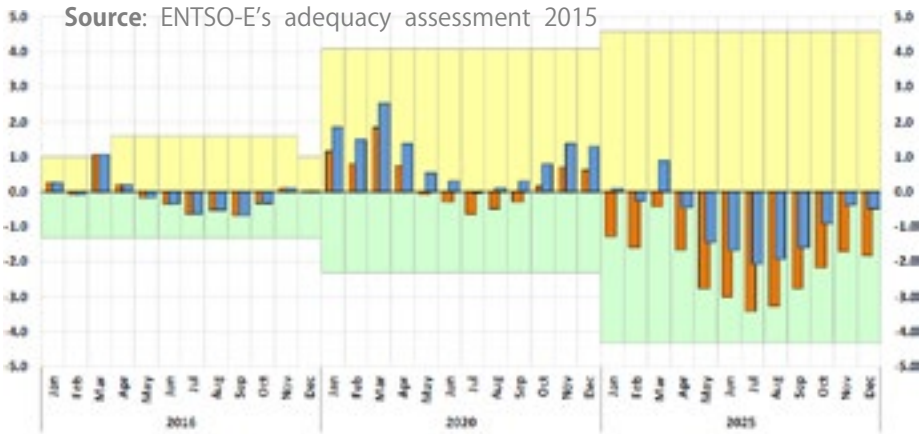
Crucial factors for the energy-intensive industry in the scope of production

Security of energy supply and its costs

Each and every distortion in sustainability of supply has an impact on final production costs in every single industry. The more serious the distortion, the higher price will be paid, both by industrial recipients and their clients.

Polish electric power grid went through a brownout in August of 2015. Moreover, according to forecasts carried out by ENTSO-E, stability of power supply is also significantly endangered in a long-term perspective. There are several reasons behind it, namely poor potentialities of intersystem exchange, obsolete infrastructure of both generation and transmission as well as lack of effectiveness of demand response systems which were implemented to date.

Figure 1. Safety of Polish electric energy system from ENTSO-E's point of view



As stated in the EC's legislative package, demand-response is, alongside with storage of electricity, called 'flexible asset most needed by the system'. Past efforts leading to implementation of the demand-side response scheme by Polish Transmission System Operator were not successful, due to low value of contracted capacity as well as the fact that the contracted parties were directly or indirectly connected to energy sector. Underlying reasons for this situation involved both lack of constant capacity fee for readiness to reduce the demand (which is both required by the Commission's soft law and constitute good market standard, present in most similar systems) as well as maladjustment of the proposed reduction programs to industrial reality. It has to be stated that electro-intensive industries in such countries as e.g. Italy, France, Spain or Germany benefit from serious public incentive for performed reductions, valuing of up to EUR 138.000,00 per MW per year, which further deepens the competitiveness gap between energy intensive companies located in Poland and those present in other EU Member States.

After constructive discussions between industrial recipients and representatives of regulatory bodies, a new ▶

regulation in this regard came into force recently and it provides for two different modes of service involving reduction by the biggest recipients, one of which requires payment for readiness. Whether the new approach will guarantee wide participation of industry representatives only time will tell. One must keep in mind, however, that current demand response system in Poland is transitory and has to be ousted by the introduction of capacity mechanism which may both constitute a chance (for entities willing to render demand-side response services) as well as a serious threat for all energy intensive companies, by raising their electricity bill by circa EUR 8 to 10 per MWh . It seems obvious that, in case of lack of significant relief from the above-mentioned capacity fee and at the current level of public encumbrances and the net price of electricity in Poland, energy-intensive companies will get a significant negative incentive concerning their Polish investments or, eventually, move their enterprises to countries with bigger external pressure on pricing mechanisms and more favourable policies.

Supply of energy from foreign producers and electricity purchase prices

Closer market integration may contribute to lower cost of production of goods. It is common that producers of energy located within the region of European Union offer different prices for the same product.

The European Commission notes that some interconnectors are only used to 25% of their capacities, often due to uncoordinated national limitations, and that member states have not been able to agree on appropriate price zones. This illustrates that there is a need for more coordination between Transmission System Operators (TSOs) and regulators. Successful examples of voluntary and mandatory cooperation between TSOs, regulators and governments have shown that regional cooperation can improve market functioning and significantly reduce cost of energy supply.

> Closer market integration may contribute to lower cost of production of goods

Even though the Third Energy Package has brought significant regulations to European model for internal electricity market, it has not been sufficient to open some of electricity markets to external competition. Technical constraints leading to a lack of possibility to import electricity from other member states are the main cause of insufficient external pressure on electricity prices in Poland, which are currently one of the highest in Europe. According to information provided by Polish Transmission System Operator, currently there is no possibility to reserve technical capacities of interconnectors for purposes associated with importation and those capacities may only be used for transmission of reactive power and inter-operator technical exchange purposes. The underlying reason is the risk of loop flows from Germany as well as the risk of general instability of Polish electricity system.

Secure and competitively priced supplies are one of the objectives of the European Union policy on energy . Unfortunately, this goal is still not achieved in the Union as a whole. In the eastern parts of the EU, even though internal markets are based on non-discriminatory access rules, actual contribution of foreign producers of energy in the electro energy system is limited. Taking Poland as an example, at a local level the price of energy is set mainly by capacity of production by state-controlled bodies (PGE, Tauron, Enea and Energa) of which generation relies heavily on fossil fuels (coal). The competition on the market is certainly limited. What is more, public interventions can be considered substantial. This has significant influence on the costs and prices of electricity with continued negative effects on energy-intensive industry.

Energy efficiency – lack of use as the cheapest energy source?

Energy efficiency is referred to in the Clean Energy Package as the cheapest and most economically sound energy source. According to the Memo accompanying the Commission's draft in this regard, ambitious energy efficiency targets for 2030 can reduce member states' dependence on energy imports, boost the local economy, increase its competitiveness and create additional green jobs.

The impetus of the EU institutions, with which those authorities propose new purposes concerning energy efficiency, however, seems to be odd, as far as there are technologies used in the industry which cannot be further improved and installing the replacements will not result in further significant improvement of energy efficiency. It has to be noted that many of the installations had to be replaced or substantially modernised as a result of implementation of other EU regulations such as IED and LCP Directives.

Due to the above considerations, it seems indispensable for every member state government to take into consideration the potential of the industry to carry out further modernisations with a view to improve energy efficiency when determining their particular, national efficiency purposes. Otherwise, willingness to pursue ambitious goals may produce an effect which would be opposite to what the Commission promotes in the above-mentioned Memo.

Network charges

Concerning Clean Energy Package philosophy, it has to be observed that it aims to grant specific rights to end users such as, the right to smart metering or flexible electricity ▶

CONTINUED

ARCELOR MITTAL

The enhanced role of consumer from the point of view of energy-intensive industry


Electric arc furnace
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tariff with prices depending on hours of supply, but in no way does it grant freedom from additional burdens or helps in combating regulatory gaps regarding pricing of electricity distribution and transmission in different member states.

A wide variety of different charges associated with use of the grid are currently levied on energy-intensive companies in Poland. Most of them are not directly connected with distribution pricing (i.e. justified return from the use of capital plus margin), but derive from regulatory framework and, whilst collected by distribution or transmission system operators, are then being transferred to an account of a public body responsible for different aspects of functioning of electricity sector. The charges in question are the qualitative and transitory fees.

The qualitative fee is charged by Polish TSO and then spent on capacity mechanisms such as cold reserve or strategic reserve, which is composed of some outdated electricity production sources, which can be launched on TSO's request. The level of the fee raises annually and currently it amounts to circa EUR 3,00 per MWh.

The reasoning behind the transitory fee was to cover the so-called stranded costs, resulting from resolution of long-term agreements, with view to liberalise Polish electricity market. What is odd, the costs in question have already been covered (with a few exceptions) but not only is the fee still being collected – it also rises annually. After the last few amendments of law, outstanding amount of collected fees is spent on administrative needs of a body assigned to manage certain aspects of functioning of renewable energy sector.

There are of course some exemptions from those fees, but the statutory thresholds allowing a company to benefit from those have been set at such a level that currently only one company in Poland qualifies for the exemption.

The perspective is slightly different in other EU member states, where not only widely-available exemptions from additional fees are present, but also where industrial recipients are able to benefit from ordinary fees from transmission and distribution.

Summary

Only proper market architecture and well-designed proposals for its development can guarantee benefits for all market participants and help to develop an internal market for electricity, without technical barriers and competitiveness gaps.

From the perspective of different member states, a happy medium has to be found, in order to reconcile ambitious political agenda with industrial (empirical) reality, otherwise not only the new role of energy intensive recipients, but existence of industry in general would be threatened.

ANALYSIS

Technology neutrality principle as a cornerstone of EU energy policy

Maciej JAKUBIK
Executive Director
Central Europe Energy Partners

While publishing its Clean Energy for all Europeans package, the European Commission was aiming to draw up proposals, which could make the energy market in Europe function properly. The popular commonly believed assumption among the experts is that the markets are not prepared for 21st century challenges, in particular for new technologies, widespread use of renewable energy and the expanding role of self-consumers. Representatives of the industry, including CEEP, have often voiced their admonishments and reservations about the current state of the electricity market and thus encouraged the Commission to proceed with the relevant proposals.

Unfortunately, while redesigning the internal electricity market, the Clean energy package not fully comply with one of the main principles, which is technology neutrality. What stands behind this notion? The theory says that a policy shall not favour any particular means of achieving the assumed goals. A policy has to treat all methods on equal footing, which will then bring expected results. It is up to market players to decide which means are used to resolve a problem. Technology neutrality is the best way to boost innovation as it creates space for research thus increasing the desire to search for novel solutions. On the other hand, if we use technology specific approach, it can discourage the process of searching for new answers and we can get stuck with solutions from often subsidised branches.

Greater free choice of technology is the domain of free market economy: "From a philosophical perspective, the imposition of very specific technological targets is typical of the economic planning tradition, whereas the use of technology-neutral processes or instruments expresses belief in the power of market forces". (The Next Generation of Economic Issues in Energy Policy in Europe, CEPR, 2016).

Therefore, the use of technology neutrality principle best suits the current state of liberalised European energy markets, as it assumes the free choice in using any energy sources and supports innovation and modernisation. It is up to each market player to decide how to achieve the goals assumed by the package, whichever they may be: renewables, nuclear, gas, oil or coal.

Unfortunately, the Clean energy package contains many provisions that breach this fundamental principle. First of all, it introduces Emission performance standards (EPS) to capacity markets therefore forcing countries that have already introduced the capacity remuneration mechanisms (CRM) to use only certain technologies, preventing other ones from being used. It does not take into account the specificity of European markets, including those from Central Europe, and can pose serious challenges for those using the CRM, undermining the functionality of the concept. Meanwhile "capacity mechanisms can form a part of a larger plan to restore a more favourable pathway for energy investments in Europe, provided they are designed in a market-based and technology neutral way so as to complement the energy-only market" (Capacity mechanisms. Reigniting Europe's energy markets, Linklaters, 2014)

Secondly, it introduces technology-specific approach to renewables. Exclusion of biomass as a renewable source puts in question the to-date policy and casts in doubt the already commissioned and ongoing investments. The proposed direct link between RES-biomass and high-efficiency cogeneration may impede the development of RES in certain countries.

Thirdly, the pan-European perspective for RES development should assume free choice of renewable technology for some regions which have specific geographical and climate conditions. Massive deployment of PV in the Nordic countries and wind farms in densely populated areas do not exactly fit this reality. Therefore, it must be up to the market players to choose which choices make most economic sense and which are the most beneficial locations for a given technology.

Technology neutrality principle was confirmed many times in various EU declarations and documents. For example, during the last informal TTE Council on 13th of July 2016 in Bratislava, the EU energy ministers "emphasised that each country has a right to choose appropriate measures for reaching climate and energy objectives in accordance with the principle of technological neutrality".

To stay consistent with its approach towards the energy market, the EU should stick to the rules and principles, its acquis and practices are based on. Therefore, if we wish the electricity markets to function properly, the technology neutrality principle has to remain the leading element in the implementing legislation.

> It is up to market players to decide which means are used to resolve a problem

REPORT

WEF: trends affecting the electricity grid

Cristina DASCĂLU
Communications coordinator
Central Europe Energy Partners
Summary of the report "The Future of Electricity. New Technologies Transforming the Grid Edge", WEF, 2017

The electricity system is on the cusp of change and three trends in particular are converging to produce game-changing disruptions from generation to beyond the meter: electrification, decentralisation and digitalisation, as identified in a recent report of World Economic Forum: "The Future of Electricity. New Technologies Transforming the Grid Edge".

Electrification of large sectors of the economy such as transport and heating. As the energy needs evolve and the focus shifts from access to sustainability, security and affordability, electricity is ready to reveal its full potential as the energy carrier of the future. Electrification provides a meaningful way to achieve significant decarbonisation of European economy. Getting there, however, as the authors of the report point out, will require recognition and leadership from European policy makers, investment and innovation from the industry, as well as buy-in from citizens.

Decentralisation, which will give the customer the opportunity to become an active element of the system, is spurred by the sharp decrease in costs of distributed energy resources (DERs): distributed storage, distributed generation, demand flexibility and energy efficiency.

Digitalisation of both the grid, with smart metering, smart sensors, automation and other digital network technologies, and beyond the meter, with the advent of the Internet of Things and a surge in connected power-consuming devices.

In the light of all this, the role of the grid is evolving beyond supplying electricity and we are moving towards a system where traditional boundaries between producers, distributors and customers are blurred.

As the authors underline, these trends create a virtuous cycle, positively reinforcing themselves. Electrification is critical for long-term carbon reduction goals. Decentralisation puts the consumer at the heart of the process, with an active role in the system. Digitalisation supports both the other trends by enabling more control, including automatic, real-time optimisation of consumption and production as well as interaction with customers.

These three trends apply at the "grid edge", smart and connected technologies at the end of the electric power grid, and their implementation in OECD countries could bring $2.4 trillion (€2.2 trillion) of created economic value for society and the industry over the next ten years. This would come from new jobs, the reduction of CO2 emissions coming from increased efficiency, and creation of new client services. This transformation of electricity will benefit not only the industry, but customers and the environment as well, but it is worth noting that the system faces great risk of value destruction if it fails to capture the benefits of distributed energy resources, which could result in stranded network assets and eventually customer defection from the grid. Hence, we speak of a transition that has to be done in a timely and cost effective manner, shaped around four keywords: regulation, infrastructure, business models and customer engagement.

> These three trends apply at the "grid edge", smart and connected technologies at the end of the electric power grid

Authors' recommendations to successfully achieve this sine qua non transition are:

1. Redesign the regulatory paradigm. Change the rules of the game, advancing and reforming regulations to enable new roles for distribution network operators, innovation and full integration of distributed energy resources.

2. Deploy enabling infrastructure. Ensure timely deployment of infrastructure to enable new business models and the future energy system.

3. Redefine customer experience. Incorporate the new reality of a digital, customer-empowered, interactive electricity system.

4. Embrace new business models. Pursue new revenue sources from innovative distribution and retail services, and develop business models to adapt to the Fourth Industrial Revolution.

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Central Europe Energy Partners (CEEP) represents energy and energy-intensive companies and organisations from four Central European countries, employing over 300,000 workers, with a total annual revenue of more than EUR 50 billion. CEEP is the first major body to represent the energy sector companies from the region at the EU level. The aim of CEEP is to strengthen the region's energy security within the framework of a common EU energy and energy security policy. CEEP is an international non-profit association with its headquarters in Brussels.

Central Europe Energy Partners, AISBL
Rue Froissart 123–133, 1040 Brussels
Phone: +32 2 880 72 97
E-mail: brussels@ceep.be
www.ceep.be

@CEEP_energy

www.linkedin.com/company/central-europe-energy-partners