Capacity Market
as means to avoid blackouts

Assessment of the impact of implementation of a comprehensive capacity market mechanism in Poland

Appendix II

PKEE
Polish Electricity Association

Detailed proposals for changes to functioning of the electricity and regulating ancillary services markets

This appendix presents explanation of the position of PKEE on proposed changes to functioning of the electricity and ancillary services markets with the exception of operating reserve and the interventional cold reserve, which have been described in the main part of the report.
As demonstrated in the main part of the report, dynamic growth of the subsidised RES resulted in disclosure of lack of adequacy of the energy only market (EOM) in the context of constraints resulting from the technical nature of the electricity system and the challenges put ahead of this sector by the European Union's climate policy. In market economies the value of goods is a derivative of supply and demand equilibrium, and continuous competition leads to decreasing prices of products, sometimes at the expense of their quality. In case of permanent loss of profitability of assets, the producer should take a decision on their termination. Such moves are intended to mitigate losses and this is one of the basic rules of running a business. In the electricity market reality the quality standards are determined by rigorous technical requirements, and lack of energy storage capabilities results in the need to maintain a capacity reserves in conventional units to cover the peak demands or unplanned drop of generation from the RES. At the same time there is no effective mechanism of remunerating the generating capacities that are needed to guarantee the security of operation of the electricity system. Due to the above, a realistic risk of electricity supply outages emerged, causing a broad debate on the effectiveness of the energy only market (EOM), as well as on ways of solving this problem while taking into account the available market based tools.

This is why within PKEE we took on the challenge to study the emerging problem as well as to find systemic solutions that would be characterised by the lowest social cost in order to assure the necessary electricity supply reliability indicators.

The results of the conducted analyses unambiguously point to the need of further evolution of the current market model (EOM plus) in a direction that will assure maximisation of the social welfare and guarantee of electricity supply security in the transitional period, i.e. until first capacity market remunerations will be made. Such approach also finds justification in public good categories understood as general access to electricity and establishment of fundamental conditions for further economic growth of Poland. This is why we are convinced that the electricity and the ancillary services markets should be modified so as to assure economically effective and safe utilisation of existing supply and demand resources (security constrained economic dispatch). Evolution of these markets should allow correct valuation of electricity at times of capacity deficits and should disclose the actual value of generation capacities from the point of view of their location in the electricity system and significance to further integration of the RES. It should be stressed that a correct design of electricity and ancillary services market should lead to higher competitiveness of bids submitted on the capacity market and as result to lowering the total costs of operation of the electricity system.

Modification of principles of operation of electricity market

Harmonisation of price caps on wholesale markets

At present individual segments of wholesale electricity market in Poland are subject to different price caps that preclude correct valuation of the supply side in extreme situations. These price caps are as following:

- BM and DAM: 1500.00 PLN/MWh;
- RDS: 3000.00 EUR/MWh;
- IDM: no limitations.

To reflect the real value of electricity in capacity deficit situations it is necessary to raise and harmonise the above price caps to a level resulting from VoLL or from the guidelines that are an element of the process of creation of the pan-European electricity market. But it has to be stressed at this point that any limitations are contrary to the competitive markets theory where the value of merchandise should reflect the results of supply and demand law. Raising the price caps could result in additional revenues to generating units threatened with loss of profitability and also lead to effective demand side regulation through demand reductions by consumers during the peak hours. This kind of stimulation of market participant behaviours could contribute towards mitigation of risk of imbalances in the National Electricity System and thus maximisation of social welfare.

Improving the liquidity of Intraday Market (IDM) by amendment of tendering principles on the Balancing Market (BM)

One of the elements capable of solving the problem of incorrect valuations of electricity on the spot market would be to improve the liquidity of the IDM market by amendment of tendering principles on the balancing market (BM). For this purpose the proposal consists of activating the utility generators on the IDM by harmonising the rules of submission and amendment of balancing bids with the guidelines currently used in Intraday Energy Sales Agreement Submission (ZUSEB on Polish Power Exchange - POLPX) contract positions – i.e. introduction of possibility to modify the Balancing Bid Submission Commercial Section (ZOBH on POLPX) by CDGUs at the latest until 2 hours before the delivery period. Continuous valuation of generation capacities could result in lowering the costs of balancing the RES and is in line with the concept of construction of the pan-European electricity market, in conformance with the guidelines set forth by the grid codes.

Making the valuation of flexibility and location of generating capacities more realistic

Correctly designed set of ancillary services should be supplementing the energy only market (EOM and EOM plus) or capacity market (CRM) with location signals and appropriate valuation of flexibility offered by producers and active consumers (DSR). It is very important for assuring stable operation of the electricity system and further integration of the RES in a situation of crisis caused by the missing money and missing capacity phenomena. This is why, following the example of other European countries (e.g. Czech Republic) care should be taken to make sure the regulating ancillary services gain in value from the point of view of assets that guarantee the long-term energy security. At present the regulating ancillary services are provided primarily by the CDGUs on technical market, the objective of which is to assure appropriate power supply quality parameters in individual nodes of the transmission system.

Our proposals, based also on foreign solutions, are modifying the catalogue or specifications of selected ancillary services so as to assure cost flexibility of secure electricity and capacity supply to the National Electricity System. The proposed solutions are mainly of direction setting nature thus we count on them becoming a starting point for further discussion with participation of the TSO and representatives of the electricity sector.

Location premium for capacity supplies to the National Electricity System

The copper plate model adopted in Poland does not assure the location signals that are the characteristic element of markets based on nodal prices (e.g. PJM in the USA). A correctly parameterised set of ancillary services should assure the required scope of regulation of capacity and voltage offered in individual transmission system nodes by the producers or active consumers (DSR). This is of extreme importance from the point of view of assuring electricity supply security in times of increasing use of non-dispatchable energy sources. This is why forced generation, besides free balancing cleared using the deviation clearing price, is one of the primary tools required for assuring the quality parameters of power supply.

The real value of location of conventional sources would be the proposed realistic updating of prices for forced generation with respect to the static clearing algorithm (1.05 x GP + C_{CO2}). The pricing formula in use creates nearly sure risk of losses to generators participating in forced generation as the 5% correction factor does not take into account the drop in generation efficiency in function of load, and thus also does not allow recovery of fixed costs that in case of conventional units constitute ca. 30-50% of their total production costs.

Due to the above we postulate increasing the remuneration for forced generation to the level assuring full recovery of costs of generation in generating units that are necessary to assure electricity supply security (e.g. to a level of 1.2 x GP + C_{CO2}).

Premium for flexibility of supplies to the National Electricity System

Due to dynamic increase in utilisation of non-dispatchable energy sources, in particular wind and solar power plants, flexibility of capacity regulation is becoming ever more important and valuable, and it may be provided both by conventional units, mainly gas-fired or coal-fired, and end--users able to reduce their consumption upon request of the TSO. Unfortunately the present model of operation of the electricity market does not guarantee an adequate level of premium for flexibility as the total remuneration to producers for provision of ancillary regulation services (with exception of activations, OCR, and ICR) does not exceed a few percent share in their sales revenues. At the same time there are several reasons that in future will cause increase in flexibility of capacity supply. The dominating factors include:

• Further growth of installed capacity of non-dispatchable RES sources, mainly in Poland but also in neighbouring countries, stimulated by the European Union's climate policy

• Significant growth of peak capacity demand resulting out of increasingly common use of electricity for heating and air conditioning,

• Growth of per unit installed capacity of single units as result of construction of generating units in capacity class of 900 MW and higher.

Due to lack of mature storage technologies and still negligible extent of use of the DSR, in the nearest years one should expect that the regulation ancillary services will be provided primarily by conventional generating units that already today are the main guarantee of social welfare understood as assuring cost competitive and general access to electricity. At the same time disturbances in wholesale electricity prices (caused by increasing growth of subsidised renewable energy sources) resulted in a situation where preserving the plants required for assuring appropriate volume of ancillary services becomes problematic for economic reasons.

This paradoxical situation where despite increase in demand for ancillary services their value does not grow, in our opinion should at the least give raise to reconsideration of the way of remunerating for flexibility in the National Electricity System.

In our analysis we have identified series of ancillary services that valuate flexibility in a very simplified manner thus not guaranteeing maintaining an appropriate volume of installed capacity of generating units that can fulfil such function. Therefore we are proposing a series of actions listed below and oriented on basing the clearing in the technical market on market rules and thus disclosing the real value of flexibility from the point of view of electricity supply security and continued integration of the RES.

1. Price for participation of generating units in regulation in every hour currently is set using the algorithm P_{REG} = 0.05 x GP. Since the actual cost of providing such service is several fold higher, we postulate increasing the remuneration to at least P_{REG} = 0.15 x GP. Such a move would reflect the significance of regulation to assuring operating security of the National Electricity System.

REG

2. The GP price calculation mechanism does not take into account the fact that units providing ancillary services rarely operate at an optimal operating point, as typically they are following the changes in demand by customers or generation by non-dispatchable RES. Currently the GP is set for averaged cost parameters that unfortunately do not reflect the real operating conditions of conventional power plants and create significant risk of losses to producers. This is why we propose that the GP price shall be calculated taking into account the real characteristics of costly units or at least based on several cost bands (e.g. 3 to 5) representing the characteristic operating points of generation units.

3. Remuneration component should be introduced for readiness to provide primary and secondary regulation for every unit of regulating capacity (MW) to allow full recovery of costs of provision of such services along with the necessary profit margin. The basis for calculation of payment due may be the full range of capacities from minimum to maximum, including operation of primary and secondary regulation at a price based on fixed costs (e.g. 0.15 GP).

4. Similarly, in case of voltage and reactive power regulation (Power Plant Automatic Voltage Regulators) there should be a fixed remuneration for readiness to provide such regulation and it should fully cover the costs of providing the service along with the necessary profit margin. The rate may be defined separately for each service provider through price negotiations or tender.

5. Expansion of the catalogue of regulating ancillary services should take into account the technical characteristics of the National Electricity System and solutions broadly used in foreign markets characterised by bigger utilisation of the RES. In this case consideration should be given to introduction of primarily the following services:

- Capacity reserve available for up to 5 minutes for capacity spikes and drops;
- Capacity reserve available for up to 15 minutes for capacity spikes and drops;
- Capacity reserve available for up to 30 minutes for capacity spikes and drops;
- Remuneration for extent of the regulating range of a unit;
- Remuneration for possibility to activate a power plant "from scratch" in normal grid operation;
- Remuneration for possibility of operation to cover own power requirements (isolated system, island operation).

Elimination of disturbances to operation of the energy only market

Another group of remedial actions we propose concerns the selected elements of electricity market operation model that we consider as dysfunctional solutions in their present form.

Electricity pricing at times of introduction of electricity consumption curtailments

In our opinion introducing administrative decisions on demand curtailment in situations threatening the balance in the National Electricity System contradicts the basic principles of operation of competitive markets (just like price caps on wholesale markets), as it rules out the possibility of discovering the real value of electricity in situations of supply shortage (lack of reflection of demand flexibility). In order to rebuild the artificially suppressed pricing signals that should be assuring retention of existing generating units in the system or development of new peaking sources and increase in utilisation of the DSR it is necessary to introduce a parallel administrative mechanism for setting the clearing price on the wholesale market in situations of introduction of supply curtailment degrees.

Equal rights for electricity purchases on the market

In the present situation the TSO has preferential non-market based terms and conditions of purchasing electricity for inter-operator intersystem exchange, that at the same time lower the level of demand on the balancing market. Due to the above the TSO is utilising the possibility to force production by selected generating units at a fixed price with only 5% surplus over variable costs of generation, thus providing the TSO with a privileged access to electricity they are using for their own balancing needs. Therefore we are postulating implementation of appropriate amendments to the Transmission Grid Code to remove the dependence of balancing market demand on actions of the TSO under redispatching.

The use of present model of including redispatching in the mechanism setting prices on the BM has resulted in the first half of 2016 in drop of revenues of conventional sources by around PLN 180 million. Although our primary suggested remedy is to simply eliminate that change, it also seems admissible to compensate the lost revenues by an increase of the OCR budget or by creation of a separate mechanism of remuneration for sources activated due to inter-operator activities. We however underline that in case of further use of redispatching in a way and scale as in the first half of 2016, the most stable solution is to take it into account in the balancing market demand, as this would allow a return to the competitive energy purchasing by the TSO and competitive remuneration of producers for their production.

The costs of removing grid constraints

At present the TSO transfers part of costs of removing grid constraints to electricity producers by joint balancing of the "settlement scheduled generating units" (JGWr) . This takes place when grid constraints result in the need to increase generation in selected units belonging to a specific company and a decrease in others. Since every producer prepares the schedule of generating units to which they allocate their sales in an economically optimum way, a swap of units generating electricity within a single company results in additional production costs. Part of costs of such operations is returned to the producers in form of Energy Sales Agreement reallocation cost compensation service.

We propose an amendment to the operation of the TSO consisting of refund of the full amount of change of production costs that results from elimination of grid constraints by the TSO.